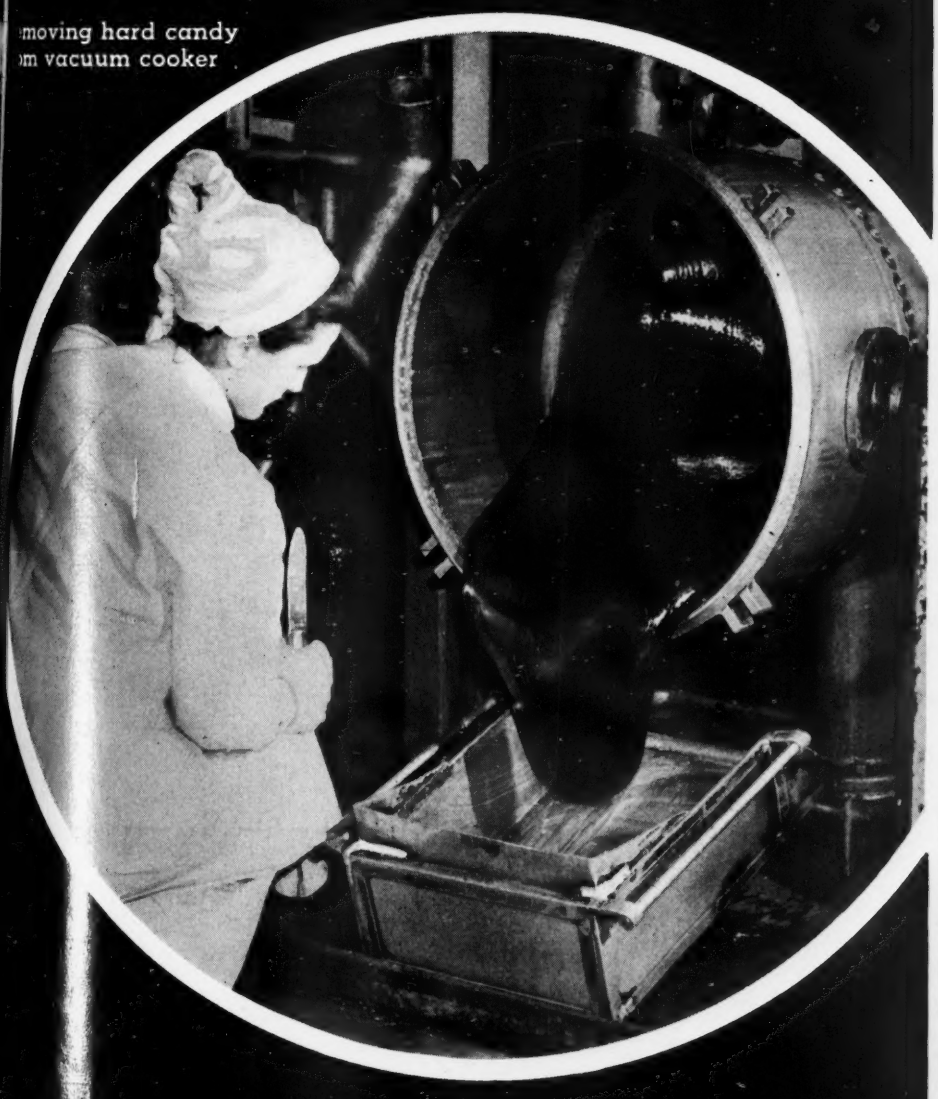
JUL 5 1944

FOOD INDUSTRIES

● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION



moving hard candy
m vacuum cooker

MAY 1944

Blueprint Of a Big Success

Right, Wrong Ways Of Pressure Cooling

How To Preserve Vegetables with Salt

Sulphiting Retards Deterioration

Vacuum Sealing Retains Vitamin C

17 Ways To Recruit Seasonal Labor

U. S. Army's Can Coating Program

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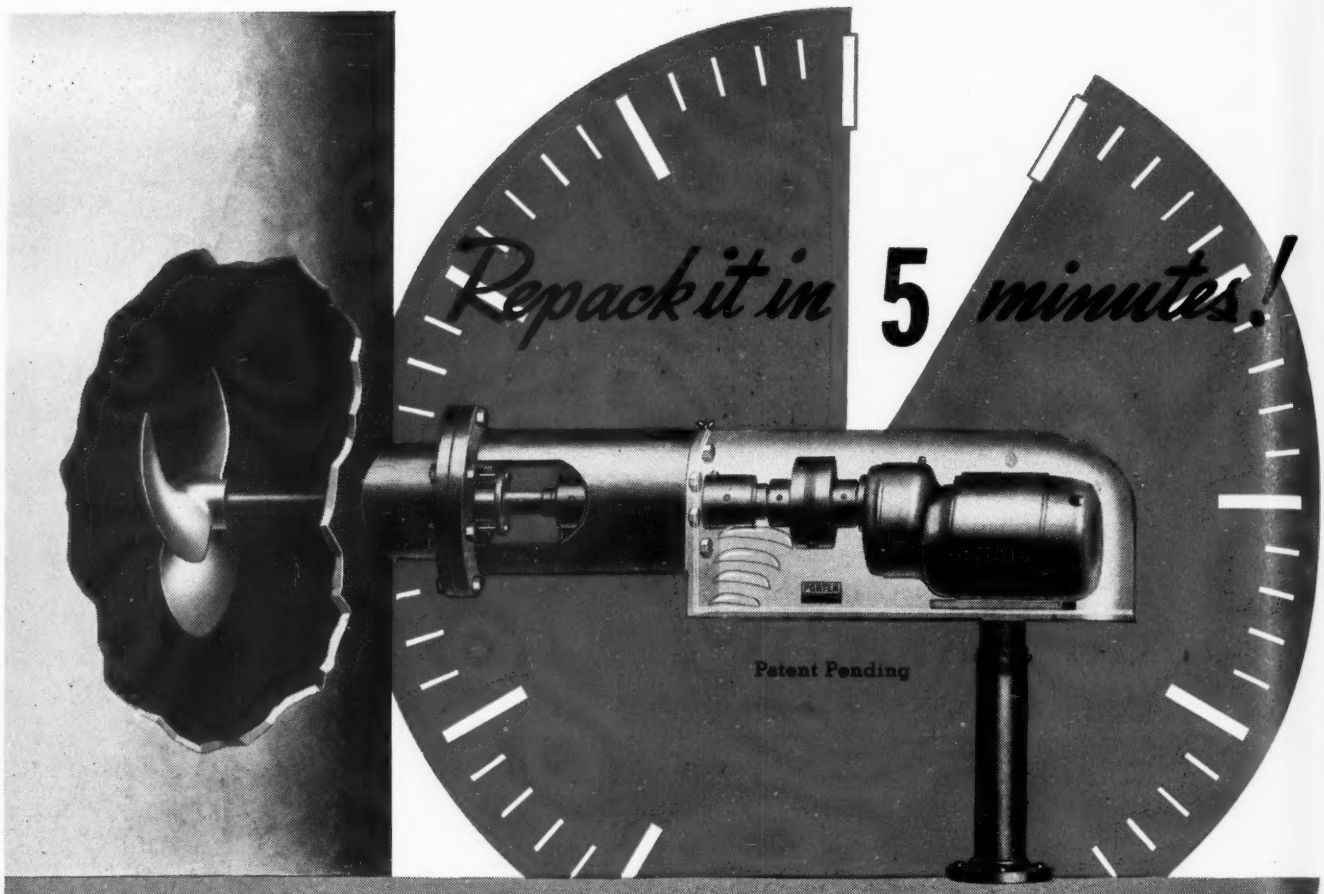

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NEW- *Adjustable Motor Support*
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Established 1866

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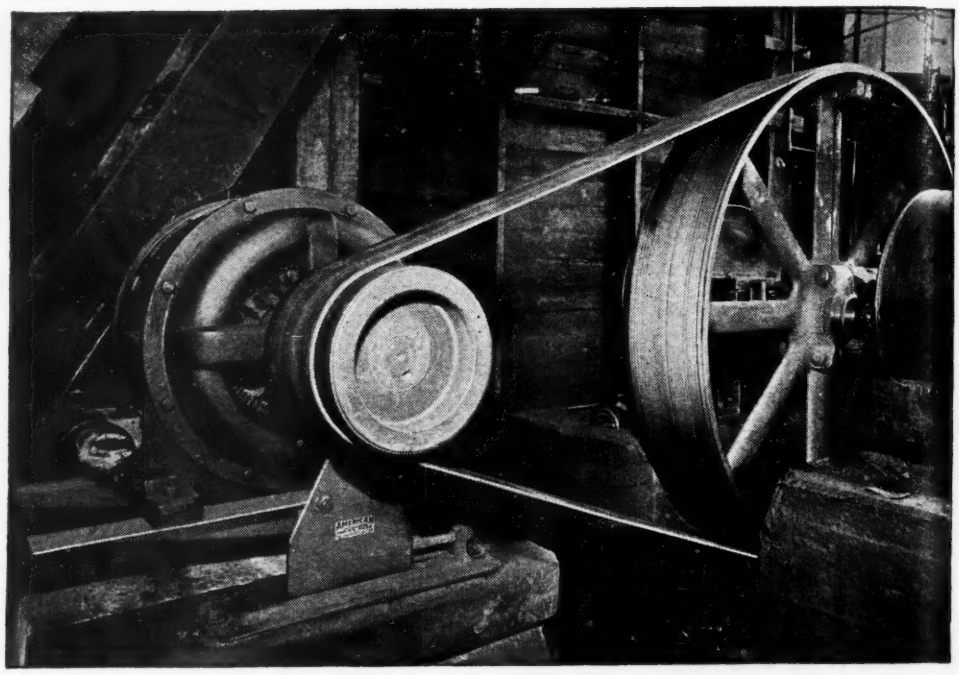
This Drive Makes One *Belt* Outlast *Five*...

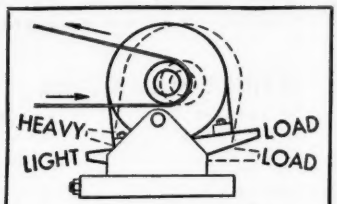


American Econ-o-matic Drives, with automatic belt tension control, offer you benefits and economies no ordinary drive can give you. Here is a good example:

Up to 1938, the compressor shown above was operated by a drive equipped with an idler pulley to maintain belt tension. Belts—and they cost $57.60 each—wore out in a year. Moreover, an average of three hours a week in maintenance time was required to keep the drive in operation.

In 1938 this compressor was equipped with an American Econ-o-matic Drive and a new belt installed. The belt hasn't been changed since and is still in good condition. One belt instead of five—$288 saved—and no shutdowns due to drive failure!

You have no belt tension problem when you use American Econ-o-matic Drives. Nothing "magic" about them—Econ-o-matic Drives merely utilize the torque reaction of the motor to automatically match belt tension to the load. On a heavy load, belt tension is increased. On a light load, belt tension is decreased. No slide rails nor idlers to adjust. It's automatic!



NOTE AUTOMATIC CONTROL OF BELT TENSION

Belt slip is eliminated. Belt and bearing life is increased. As many as 3 out of 4 drive maintenance man-hours are saved. And machine output is stepped up as much as 15%. The only way you can get automatic belt tension control is by equipping individually driven machines with American Econ-o-matic Drives. Write for your copy of the new Econ-o-matic Drive Handbook. It gives you complete drive tables, specifications and installation instructions.

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An Ideal Pulley Combination

American Steel-Split Pulleys and Hi-Torque Motor Pulleys are a true-running "team" that give you highest gripping power... longer life... exceptional accuracy... dependable service. Write for catalogs.

INVASION *and the* FINAL CHALLENGE

The idea that our national security some day would depend upon the successful invasion of continental Europe by our armed forces was inconceivable to the average American but a few short years ago. Yet, today our whole strength is assembled to that very action and for assuring a sound and permanent peace.

America became great without aggression . . . without tyranny. Our greatness has been achieved without destroying others . . . ours is a history of unprecedented industrial progress, of development of our own resources and reliance on our own efforts.

Aggression is foreign to American philosophy. Yet, today we find ourselves faced with the choice of destroying or being destroyed. Today we are confronted by the hard fact that the kind of peace which we all so fervently desire can be achieved only by crushing autocracy and by removing the causes of aggression.

We are now engaged in the accomplishment of the first objective. Since Pearl Harbor a complacent, peace-loving America—the largest of the "soft" and "decadent" democracies—has grown strong and tough. Out of the inherent virility of a free people we have moulded the mightiest force for invasion and attack that the world has ever seen.

We have reached our peak rates of war production. We are producing as much war equipment as all the rest of the world combined.

History will record our industrial mobilization as a phenomenal achievement.

The battle of production has been won!

The full might of our armed forces and those of our allies unleashed against the Axis war machine will bring eventual victory. Two and a half years of intensive preparation, backed by 168 years of growth as a free nation, has given us superiority over twenty years of painstaking preparation by the totalitarian and militaristic countries with their enslaved peoples.

Every American has contributed toward this powerful offensive. Our manufacturers and business leaders have exerted their fullest efforts. Our industries have mobilized their tremendous resources—tapped to the fullest degree their inventive and productive genius. The men and women in the factories, on the farms, and in the mills and mines have played a magnificent

part in the tremendous production program. Citizens all are making their contribution to the armed victory that lies ahead

We have demonstrated that a free people under a free enterprise economy can unite in a common purpose.

* * *

When the war is won, we shall be faced by our second objective . . . removing the causes of aggression. This is a social challenge. A challenge to those who would sacrifice our democratic way of life for personal gains or foreign ideologies.

The best insurance for the continuance of our democracy is a successful democracy. That means a dynamic and not a static democracy. All of us who want to preserve the ideals that have made America . . . and that includes all but a handful of extremists . . . must determine to find the policies and programs which will permit us to make the most of the abundance nature has provided for us.

To achieve this end we must recognize the fact that we are but a wheel in the machinery of world economy. A wheel that must drive or be driven. A wheel that must mesh smoothly with the many other wheels or be stripped of its cogs.

We are the only nation on earth free enough and strong enough to shape the mould of its own destiny. We can be hampered by nothing but our own confusion.

* * *

The mind and the heart of all America today brood over the shores of Britain and watch over the narrow waters that wash the beaches of the Continent. And the prayers of all America go with each of those who embark upon that epic passage.

Those of us at home who are producing the fighting tools and who are so earnestly concerned with the problems that will face a postwar America, should see now, even if we may never have seen it before, that all our plans will be worth just exactly what the men and women who make that passage are prepared, competent, and inspired by their leadership to make them worth.

For those men and women are America!

They have gone out from rich homes and poor homes alike, from farms and factories, from schools and churches, from mines and ranches, from offices and studios, to take their places in the battle line. They are a cross-section of the America that is to be.

Whoever may draw the plans for that America, it is those men and women who will make the plans good. Invasion is their first step toward that end. May their work be speedily done, and may our plans be worthy of that work.

President, McGraw-Hill Publishing Company, Inc.

Postwar Preparations—IX

Purpose of Postwar Planning

LEST the true purpose of postwar planning be lost to sight, it is necessary to restate it periodically, if for no other reason than to spike the guns of the cynics who, be it said, are jeeringly saying that postwar planning is a way to help business retain its alleged wartime profits. The true purpose of postwar planning, as it has been developed by CED (Committee for Economic Development, headed by Paul Hoffman, president of Studebaker Corp., and appointed by the President of the United States), is to provide jobs for returning members of the armed services.

It is not only a legal requirement to do this, it is a moral obligation; and it is nothing but enlightened common sense to keep on the payrolls as many of the wartime employees as possible. To provide this increased postwar employment, when government demands for goods evaporates, places a far greater burden on the ingenuity of business than the demands of war production.

CED AND ITS PLANS are but catalysts. CED is not going to employ anybody. Only business is going to put people to work. And it is not business as a whole but individual businesses that will employ people. No matter what CED does, it can only stimulate intellectual activity on the part of individuals (firms do not think; only individuals connected with firms can do the thinking). Furthermore, no CED, however large, is capable of doing all the thinking connected with the vast job of putting the soldiers and sailors back to work.

Some people have called the ideas of CED dreams and visions, but dreamers and visionaries have a place in the scheme of things. To be sure, their idealistic visions of the future may do no more than outline the goal to be attained, overlooking all the obstacles to its attainment. It is for us in business and industry to overcome these obstacles. To stimulate the men in the food industry to thought and suitable action in the postwar period has been the objective of this long series of editorials.

Now to get down to practical realities. If there are to be more jobs, business and industry must provide them. But it must be done at a profit to business for, if business or industry goes broke, then there will be fewer jobs. A bankrupt business is not an employer. Even when in a receivership a concern is usually trying to reduce expenses, payroll as well as other forms of disbursement.

More jobs must be predicated on more sales. But what are we going to sell and who is likely to buy it? These are the $64 questions that call for postwar planning, for when we get down to cases we find many a rub. Take a copper mine, for instance. Unless some one else has a need for copper and has the money to buy it, the mine cannot operate for long and stockpile the ores above the ground. Its financial resources cannot permit it, especially at the present when the Federal tax policy will not allow the accumulation of cash reserves for this very purpose. Hence, any postwar planning by a copper mining company to put more people to work depends on an enlarged outside demand as a result of other people's postwar planning or else of the copper mining companies' own efforts to find additional markets for copper. Somewhat the same situation prevails for lumbering, coal mining and a host of other industries.

Some have taken the same view of the food processing industries. The very stable consumption figures for food in the United States would, in the superficial view, bear this out. As long as per capita food consumption in the United States runs at 1,465 lb. per year, so runs the argument, how can we expect to sell more food unless there are more people to eat it? Yet, as I review the situation, it appears that the argument is true only in a limited sense.

We must not overlook the increasing birth rate of the nation, nor the export demands of UNRRA, nor the possibilities of increasing normal commercial exports of processed foods. More important than all these is, however, the possibility of increasing per capita food consumption within the United States. The latter is one of the most important areas to be explored in postwar planning and preparation on a long-range basis.

IN PEACETIME low-income groups require low-cost foods of high nutritive quality. There are many regions, especially cotton-producing states, where this situation is a challenge to food processors, nutritionists, public health officials, welfare workers and others. Bad dietary habits must be overcome by educational efforts, costs of food must be lowered, the better food at low cost must be made to taste so good that the public will accept it, and any understandable efforts of those who have an economic stake in foods of prior years to prevent deviation from traditional food patterns must be offset.

Herein lies a field of endeavor that will tax the highest abilities of the most forward looking men in the food processing industry.

L. V. Burton EDITOR.

The Talk of the Industry

• GERBER PRODUCTS CO. has found a way to relieve some of the housing shortage for its employees. The company appealed for rooms in private homes through an ad in the local newspaper and offered to pay $1.25 a week for each room while it is not occupied. It also offered to collect the rent from its employees and pay it to the home owners.

Eighteen days after the offer was made, accommodations for 65 people had been secured. When fully developed, this plan is expected to alleviate the company's shortage of living accommodations.

Add Renting Agent to your duties as a food company executive.

• NEW and lucrative markets for perishable farm products may be opened up by fast air transport in the postwar era, in the opinion of Secretary Wickard. Fast overnight shipment by plane would permit the heavily populated northern consuming markets to take increasing quantities of fresh fruits and vegetables grown and ripened down south in the winter months. Air transport may also bring to the American table in the postwar era some tropical food not now seen because of transportation difficulties.

But the greatest benefit from air transportation of food in the postwar period is likely to accrue to airplane manufacturers and commercial airlines.

• A SELF-SERVICE chain supermarket operator recently issued a gripe before the American Marketing Association to the effect that every package should provide a salesman on every label, that food manufacturers have barely sensed the merchandising potentialities of their packages.

This is probably true—let us bend every effort to help the self-service supermarket skim the cream of postwar business.

• "RESEARCH is the greatest constructive and destructive power that mankind possesses and controls, bar nothing." Unquote, exclamation mark.

We Must Save Paper

Increased military requirements for fiber shipping containers, waterproof papers, multiwall bags and other essential papers made from kraft pulp have materially reduced the supply of civilian products such as paper bags and wrapping paper during the second quarter of this year.

There is no available substitute for paper. Conserve it. Collect scrap paper.

• FOR some time it has been apparent that technical sales service men, employed by firms that sell food ingredients and send them out on trouble-shooting jobs, are finding less and less trouble to shoot. Odd, isn't it, when the demand exceeds the supply, how easily the customer is satisfied? But this should not cause any firm to let go its service men. Some day, they will need them—plenty.

• COLONEL PAUL P. LOGAN, QMC, told the American Medical Chemical Society at Pittsburgh that "for several known and many unknown reasons, our experience indicates that hardly any processed food will remain completely stable at temperatures of 130 deg. F. or above. Our prewar concept of food stability has been radically changed due to experiences in the South Pacific and in North Africa."

When all these governing factors are known and controllable it is likely that great advances in food technology will have been made.

In fact the advances are being made as these governing factors become known. Consider well the progress attained by stabilizing whole egg powder through reduction of moisture content from 5 to 2 percent industrially and to less than 1 percent experimentally.

Hors d'Oeuvres

• *The U. S. Public Health Service has made mandatory the physical examination of cannery workers going to Alaska for the 1944 season. It will be a 1-A salmon pack this year.*

• A survey shows that in summer 70.3 percent of wives sleep in nightgowns, 24 percent in pajamas, 5 percent in the nude and 0.7 percent in shorts. Possibly there is some relation between these data and the demand for vitamins.

• *According to a Supreme Court ruling, OPA has the authority to fix ceiling prices on meat. Which means that Chester Bowles is no ham.*

• A survey made for the dry cleaning industry shows that the number of gravy spots on clothes dropped from an all-time high of 5½ million in 1941 to a mere quarter of a million in 1943. Now you have heard everything.

• *The QMC and Heinz have perfected an ingenious self-heating soup can. You touch a cigarette to a fuse, p-f-f-t, and the soup gets hot. If this sort of thing keeps up, a man won't need a wife that can cook. He can marry a redhead.*

• The rise in the cost of living last year was only 3½ percent, says OPA. If so, we're being robbed.

• *It has had only one session, so it is too early to judge its effect. But the newly organized Food Forum has interesting possibilities. When you entice a bunch of Congressmen to hear talks by authorities on various food problems, you have the makings of something. And the beauty of it is that you can pick your authorities.*

• A price ceiling has been put on goat meat. Surely it must be evident after March 15 that there is no shortage of goats.

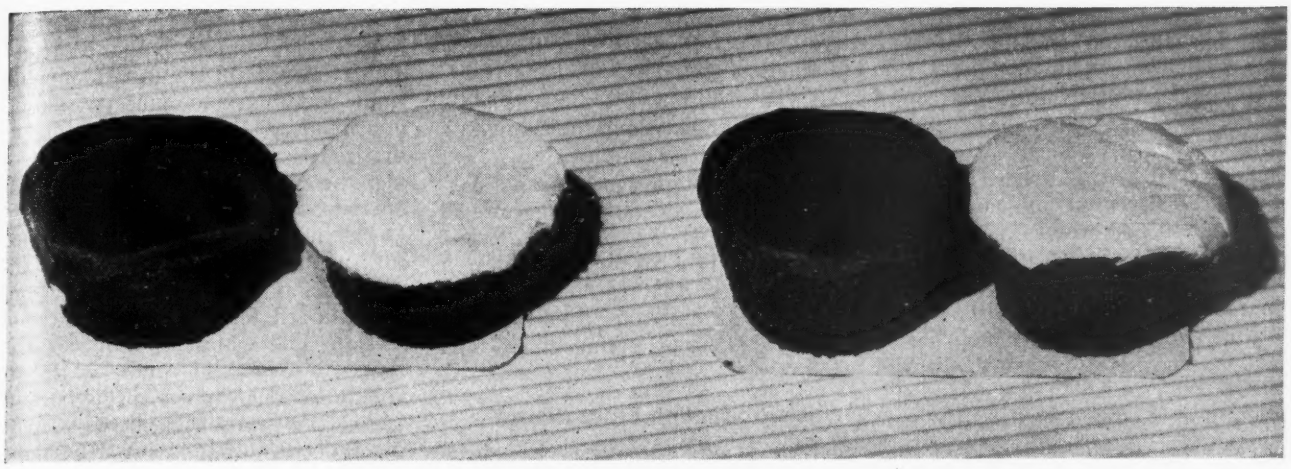
• *President Roosevelt signed the bill changing the name "dry skim milk" to "dry milk solids." Now we can go on with the war.*

• When Army-baked bread is served to soldiers, they eat 0.313 lb. per day each. If the bread is bought from commercial bakeries, they eat only 0.280 lb. Is it sense or cents that makes the difference in quality?

• *Commodities Trading Corp. is testing in court WFA's power to enforce the sale of pepper stocks to grinders at the OPA price of 6½ cents. That price, the pepper importers say, is really something to sneeze at.*

• Did you know that fats and oils are used in the manufacture of printing inks? If this column smells, blame it on rancidity.

F.K.L.



Little cupcakes like these were parlayed into big business by astute management.

Blueprint of a Big Success

Bakery hits jackpot with 5-cent cakes. Here's how — low-cost production, elimination of stale returns, immaculate plant, rigid control of processes and materials, and the idea that taste is really important

By W. R. VAN METER, Chemist, Kingston Cake Co., Kingston, Pa.

IN one of the larger cities on the East Coast is a baking plant about whose production methods and management policies there has been, for many years, considerable curiosity on the part of the baking industry. This interest focuses upon the great success the company has enjoyed since its start some 30 years ago and upon its present position as one of the few large cake bakers manufacturing exclusively for the 5-cent packaged cake market. Moreover, this interest has been accentuated by a company policy of reticence carried to the nth degree where its activities, methods and personnel have been concerned.

The early growth of the company was phenomenally rapid, so that in less than 15 years it had assumed a dominant position in the industry. And as an organization, it had expanded to approximately its present form. The years since have seen neither marked growth nor decline, for the energy of the company has been devoted to maintaining its position rather than fighting for expansion.

It has been said that the life of any business may be divided into four stages—an enterprise, an established enterprise, an enterprising establishment and an establishment. On such a scale, the company can be said to be in the fourth stage.

Reasons for Success

The industry has advanced various reasons for this company's success. It has been pointed out that the company was one of the very first to enter the packaged-cake field and so got the jump on competitors; that somehow it forced the no-stale-return rule down the throat of the grocer and otherwise dictated to distribution outlets conditions which vastly simplified its production problems; that certain popular cakes and icings were almost a monopoly of the company and were not successfully imitated by other bakers; and that the customer invariably got fresh, good-eating cake, where too often competitors' cake might be stale, moldy or misflavored.

Most of the industry's judgments are true at one point or another. It is the purpose of the writer to discuss these factors, particularly those concerning production, that have led to the company's present position in its industry.

The company has been unorthodox in its solution of many problems, a fact which has acted as a screen between it and the rest of the industry. For when it is difficult to understand the mental slant with which problems and situations are attacked—and much of the baking industry is deeply channeled in traditional methods and thinking habits—then it becomes extremely unlikely that the solutions deriving from such an attack will be either comprehended or copied.

Consequently, two of the most interesting features of the company have been little realized by the rest of the industry. These—and the writer cannot stress too heavily their importance in the success of the company—are: (1) The production side of the house is the dominant factor in operating the business; (2) the men at the head of production are not old-line bakers, but skilled engineers and able executives with a strong scientific approach to the problems of baking technology.

Unorthodox Sales Policy

Before discussing production policies and methods, two basic principles of the company's sales policy should be noted. From a very early period, if not from the beginning, stale returns were not accepted from the stores which were its retail outlets. At the same time, the amount of cake sold to any store was limited.

These procedures were far in advance of their time and encountered considerable hostility from the rest of the industry, as well as from the retail outlets. Limiting the amount of cake the company would sell to a store brought bitter cries of anguish from

many a grocery man and has been responsible for long-standing antagonisms. In more than one store, the cake was kept underneath the counter and sold only when the customer insisted on having it.

The result of this policy, from the consumer's angle, was to guarantee his getting fresh cake whenever he bought the company's product. Outlets were not allowed to have more cake than they could dispose of within the period of time determined as the shelf life of the product. The company was primarily concerned with the customer's reaction to its cake when it arrived in his mouth.

From the production standpoint, both features of the sales policy greatly simplified shop problems. There were no stale returns for the production department to worry about. When the cake was baked, packed and shipped, it represented a final sale. There would be no 4 percent, 10 percent, or more, coming back to the plant to be charged off against production as so much loss. This sales policy made it possible to estimate accurately in advance what the daily production would be.

The successful functioning of such a system required, of course, that the company know more accurately than the grocer exactly how much cake he could sell. This knowledge of the grocer's capacity was not left to the estimates of the company's salesmen, but was a matter of carefully kept office records of sales volume, backed by the constant scrutiny of route supervisors working in the field.

Certain other business policies, adopted early in the life of the company, also were influential in shaping production methods. This background material is stressed because it seems to be the usual assumption that production is a thing to be defined and discussed largely in terms of gadgets, machines and processes. Actually, the philosophies, the planning, the viewpoints and the policies behind a company are what shape its production methods. The machines and the processes are evolved from the brains of those who set them in motion.

Key Production Rules

Some of the key policies could be summarized about as follows:

1. To bake nothing which could not be sold at a profit.

2. To bake nothing unless under exactly the conditions desired. When this meant either waiting until proper machines had been invented and built in the plant, or until new methods of manufacture had been worked out, this was done.

3. To abandon all except the 5-cent market, following the idea that this was the logical market for the mass-production product.

4. To dictate to the market all the conditions under which the company's product could be handled.

5. To maintain accurate and constantly up-to-date knowledge of all costs.

6. To make a cake which would, in the only test that meant a tinker's damn, give the person eating that cake the best in flavor, eating quality and freshness.

Production Operations

It is around these general policies that the production methods of the company have been built.

The production department has complete and direct control over all phases of the manufacture of cake from the unloading of raw materials on the railroad siding to the final wrapping and packing of the finished cake.

Throughout all production operations the basic thought in mind has been to simplify and mechanize procedures so that production costs will be lowered—they are, in fact, well under the average for the industry—and to see that the individual worker in the plant acquires a minimum of skill in the baking art against the day when he may decide to change to another job. Which, when you have a good product isn't such a bad thing to do.

In the mixing and baking operations, work is done on what might be called a team basis, rather than on an individual basis as in many plants. There are no mixers, oven men, scalers or depositors in the usual sense, where one man spends his entire time on an operation such as mixing batter. Mixing and baking are done by a working crew or team, each member performing a small part of the entire operation. Since the level of skill required at any one point is low, the job is taught easily, and any one member is replaced quickly in case of emergency. The time, temperature, density of batters, and so forth, required to produce exactly the product desired are fixed, and the controls are set so that these conditions may be adhered to during the manufacture of the product.

As applied to the production of cup cakes, for example, this technic would operate about as follows: In the mixing room a crew of five or six men would have the job of feeding, operating and dumping batter from a group of, say, twelve batter-mixing machines and four egg beaters. The weighed raw materials come to the mixing room from the weighing department and are scaled for the batch to be mixed. Two of the men might tend the egg beaters. The others would feed and dump batter from the mixers, moving from one mixer to another, adding ingredients to the batch according to the time-sequence schedule and keeping the whole battery in constant operation.

The method of combining the flour, sugar, shortening and the various ingredients, as well as the time they are to be added, has already been established. The whipping time for the eggs is also set, but since the actual volume of the whip is the important factor, this is also considered as part of the control. In exactly the same way, the volume or density of the finished batter is measured. The standards for both are fixed and they are the standards to which the crew works. The actual figures obtained on batches are recorded and sent to the production department after each day's operations.

At the baking end a similar crew operates. One man sees that the depositor is kept full of batter. Another sees that the filled pans coming along the conveyor are fed into the oven. A few more men at the discharge end dump the pans as they slide down the discharge ramp, put them on the conveyor and feed them back to the depositor again. The group works as a team at unskilled jobs. The controls of the oven take care of the time and temperature of baking.

It goes without saying that there must be someone in charge with a thorough understanding of what makes the wheels go round and what to do when the controls fail to function perfectly.

The method is, admittedly, restricted to mass production. Remember, that was one of the basic policies of the company. But where the policy is applicable, it has the decided advantage of more uniform and lower cost production.

Efficient Materials Handling

In production, all materials, wherever possible, are pumped, conveyed or dropped, in preference to being lifted or trucked. Advantage is taken of gravity flow. For example, in the manufacture of pies, the canned pie fruit is opened on the 6th floor of the plant, dumped onto sloping Monel metal troughs for inspection and drainage, then dropped to the dicing machines, which cut the fruit to the desired size. The cut fruit falls from the head of the dicer through a chute to the cooking kettles on the 5th floor. The starch, sugar and fruit juice or water are also dumped into these kettles from the floor above. When cooking is complete, the pie

filling in the kettles is dropped to the cooling table just below the kettles. The filling is then carried along the tables by a series of pushers, falls into containers at the discharge end and goes immediately to the refrigerator, which is located only a few feet away. Here it is stored until needed. When the pie filling is to be used, it is dumped through a Monel metal chute into the pie-filling depositors on the 4th floor.

In preparing the dough for the pie crusts, the materials are dropped from the 6th floor and mixed on the 5th floor in a similar manner. Once the pie dough is mixed, it is dumped through chutes to the sheeting machines on the 4th floor.

Plant Scrupulously Clean

One of the most important adjuncts of production is the house service department. House service covers all phases of plant housekeeping. It operates the stock room, plant laundry, elevator service, cafeteria and watchman service, as well as the disposal of waste and the sale of marketable junk. It is responsible directly to production and therein lies a good part of the reason for its effectiveness.

The main purpose of house service is to keep the entire plant and grounds scrupulously clean. It is axiomatic in the plant that the beginning of quality control lies in the most painstaking cleanliness of everything surrounding operations, from the immediate manufacturing areas of the plant to locker rooms and lavatories.

For years the dairy industry has taken for granted the maintenance of almost surgically aseptic conditions. But to anyone familiar with the conditions often prevailing in the baking industry, it need not be pointed out how unusual this attitude is. The generally primitive idea of cleanliness and sanitation on the part of the ordinary baker is something which has always puzzled this writer. Is it because the baker has usually been the poorest paid and the most overworked of food men? Is it that baking, in many cases, is only a generation removed from the cellar-shop days of the industry?

The structure of the company's plant itself makes for cleanliness. The building is concrete and brick, and all the floors are either of concrete, brick tile or, in a few experimental installations, of metal plates. A daily hosing with scalding water and the application of deck brushes and squeegees therein keep both building and equipment immaculate. The house service men move in as soon as the bakers quit work.

Pans, tote boxes and egg cans are washed in a Metalwash machine. The nature of the baking operation is such that pan washing is not required until the end of the day, when the pans are cleaned for the next day's operations.

The coating of carbonized batter, shortening, pan grease and the like, which builds up on the bottom of the pans, cannot be removed by the usual washing treatment. Consequently, at regular intervals, all pans are soaked in a tank containing a 1 percent solution of a washing compound prepared in the plant. This compound is made up of 65 percent trisodium phosphate, 20 percent sodium carbonate and 15 percent sodium silicate. All pans are of die-cast aluminum and the sodium silicate in the compound inhibits attack of the metal by the cleaning solution. Pans are soaked in the tank from 5 to 10 minutes while the solution is kept hot by the introduction of live steam. After the pans are removed from the wash tank, any remaining carbon deposit can be flushed off with a hose. This treatment is usually needed more often in the case of pie pans, where the deposit tends to build up the fastest, and where it affects the baked product more than in the case of cake.

Good plant housekeeping and watchfulness of personnel are important factors in guarding against the presence of foreign materials in the baked cake. Many other precautions, however, are taken. All materials coming into the plants—such as flour, sugar, cocoa and starches—are sieved through fine-mesh screens before they are used by the weighing department. All the raw materials are kept in covered containers. Liquids and semiliquids—such as milk and cooked pastes—are also screened before using. Canned fruits used for pie fillings are spread on inspection

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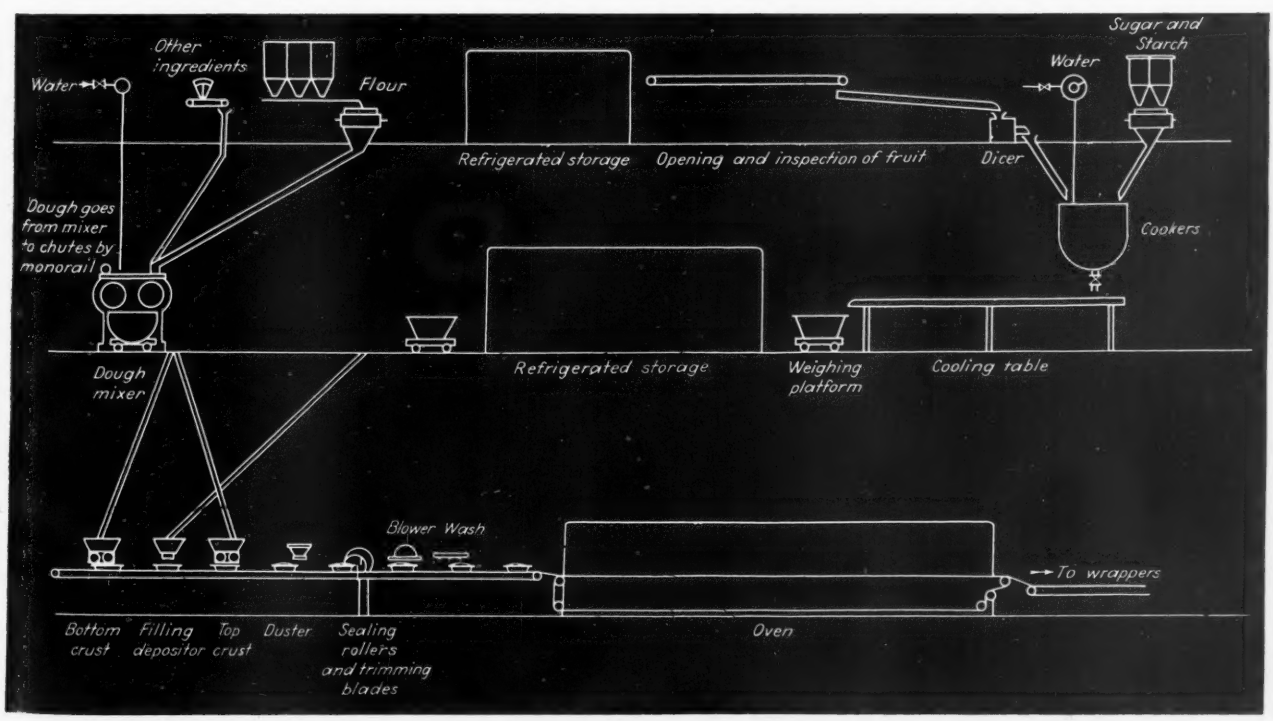

Flow diagram of pie-making operations using automatic equipment for large-scale production.

Right and Wrong Procedures In Pressure Cooling of Cans

By H. A. BENJAMIN and J. M. JACKSON,
American Can Co., Research Department, Maywood, Ill.

Unless pressure is maintained in retort while cooling cans after they have been steam sterilized, large cans may be permanently deformed. Methods, equipment, cooling schedules are given. Common errors are cited

WHEN sealed tin cans are heat-processed they develop an internal pressure which is in excess of the steam pressure in the retort. This pressure results from the combined effects of steam generated by the hot product, expansion of the product and expansion of air or other gases sealed in the can. With proper canning procedures, the latter two effects are minimized to such an extent that the cans are not damaged as long as the internal pressure is partially balanced by the external pressure of the steam in the retort. Release of the retort pressure at the beginning of the cooling period subjects the can ends to a considerably greater strain, and the elastic limit of the metal may be exceeded in cans 4¼ in., and larger, in diameter. This causes the ends to be permanently deformed, or buckled. Buckling is not only unsightly, but may strain the end double seams to such an extent that they are likely to leak and cause considerable spoilage losses. Consequently, when larger diameter cans are pressure-processed, their internal pressure must be partially balanced by maintaining more than atmospheric pressure in the retort until the cans are partially cooled. This procedure is known as "pressure cooling."

The pressure relationships are illustrated in Fig. 1, which shows both internal can pressure and retort pressure as measured during an experimental run with cream style corn in a No. 10 can.

While the data presented may not apply in all instances of commercial practice, they will serve to illustrate the point in issue. Since the buckling pressure of No. 10 cans is in the neighborhood of 15 lb. per square inch, it is obvious that it was necessary to pressure-cool this can. As a precaution, in conventional operation the retort pressure is usually increased above the processing pressure at the beginning of the cooling period to provide some tolerance in regulation of the pressure.

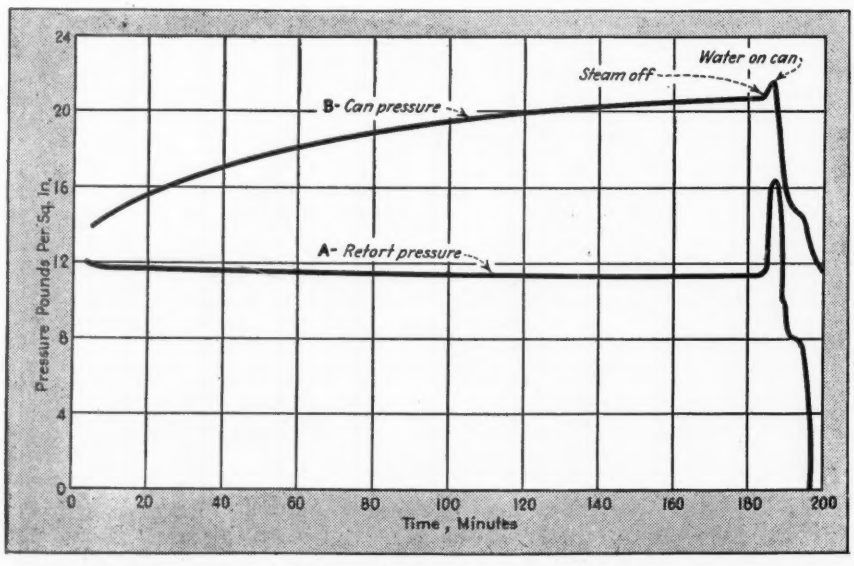

FIG. 1. Relationship between internal can pressure and retort pressure during an experimental run with cream-style corn in No. 10 can.

Different Methods

There are different methods of pressure cooling, classified as follows:

I. With air and water.
   a. Air supplied by compressor,
   b. Air injected by steam.
II. With steam and water.
III. With water only.

The choice of the method depends on individual circumstances, each method having certain advantages and disadvantages. As a general rule, the use of compressed air to maintain the pressure (Method I) is most desirable, since it permits the rapid admission of a spray of cooling water from the top of the retort to stop the "cook" as soon as possible and obtain uniform cooling of all the cans in the retort load. Use of air supplied from a compressor (Ia) permits the most rapid and uniform cooling, but large horizontal retorts may require such volumes of air that the economy of supplying air with a steam injector (Ib) is warranted.

The use of steam to maintain the pressure (Method II) is less desirable since it provides less uniform cooling than does Method I. This may result in some external rusting on the over-cooled cans and thermophilic spoilage, as well as overcooking of heat-sensitive products, in the under-cooled cans. Lack of uniformity in cooling may also cause paneling of some of the bottom cans or buckling of some of the top cans. If an excessive quantity of well water is used as a cushion during processing, some unsightly etching of the can exterior may occur. This method is cheaper, however, particularly in equipment cost. And it may prove to effect a reasonable economy with products which are not sensitive to over-cooling and in plants whose output does not justify the cost of equipment required for Method I.

The use of the steam pressure (Method II) has not been adapted to horizontal retorts to any appreciable extent, probably because it may be more difficult to keep the hot-water

cushion essential to the success of the method undisturbed while introducing the cooling water.

Use of water only (III) is a special operation allied with processing in a retort completely filled with hot water under pressure. It may be employed for glass containers and has sometimes been considered advantageous for certain meat products in cans.

Whatever method of pressure cooling is used, the cans will require additional cooling after completion of the pressure-cooling period. Cooling may be continued in the retort, but for economy of retort space, it may be desirable to transfer the cans to a canal for completion of the cool.

Pressure Cooling With Air and Water

As previously stated, compressed air is preferred for the ordinary vertical type of retort holding two to four crates. Steam-injected air is usually used for horizontal retorts for economic reasons. Figures 2 and 3 are given to illustrate the operating details for pressure cooling by Method I. Assuming that the steam-pressure process has been completed, then the steps in the cooling operation will be as follows:

1. Close all vents except the indicating petcock on the horizontal retort or the thermometer well petcock on the vertical retort which will indicate when the water level approaches the top.

2. Open valve A admitting air into the retort, and close valve S which has admitted steam during the process.

3. If automatic pressure control is used as in Fig. 3, the controlled pressure should be increased 3 or 4 lb. above the processing pressure. When the retort pressure has been increased by this amount, open water valve W admitting water in the top of the retort. The water will have to be admitted slowly at first so as not to cause a drop in pressure by too rapid condensation of steam. As the air continues to displace the condensed steam, the water flow can be increased. With manual air control as in Fig. 2, the pressure will have to be regulated by manipulation of the water valve W and lever valve A. With automatic pressure control as in Fig. 3, only the water valve W will require manipulation. Some saving in water can be realized by permitting the initial cooling water to drain for about one minute before completely filling the retort.

4. As soon as the pressure can be maintained without further use of air, the air control valve A should be closed.

5. As the retort continues to fill, the air will be compressed by the water and the pressure will tend to increase. The top valve-controlled vent V or air relief valve AR should be opened to release the air, throttling it to regulate the pressure. As the water level approaches the top as indicated by the petcock, it is well to reduce the flow rate in order that the pressure can be controlled when the retort is filled.

6. When the retort becomes filled with water, the pressure will rise suddenly. The drain valve D should be opened immediately to relieve this pressure and subsequently throttled to regulate the pressure at the desired level. The vent valve V or air relief valve AR should, of course, be closed. If a spring relief valve R is used, it will be a material aid in controlling the pressure at this time.

7. The pressure may be regulated by manipulation of the water valve W and the drain valve D. The pressure-cooling cycle is completed by reducing the pressure at a rate prescribed for the particular product being cooled.

8. If the cans are to be completely cooled in the retort, that is, to a final average temperature of 100 deg. F., the retort pressure should be held at 1 or 2 lb., after the internal can pressure is dissipated, for the duration of the cool. This insures the retort's being full of water at all times.

The operations employing air from a compressor in a horizontal retort or injected air in a vertical retort are entirely similar and consequently are not repeated.

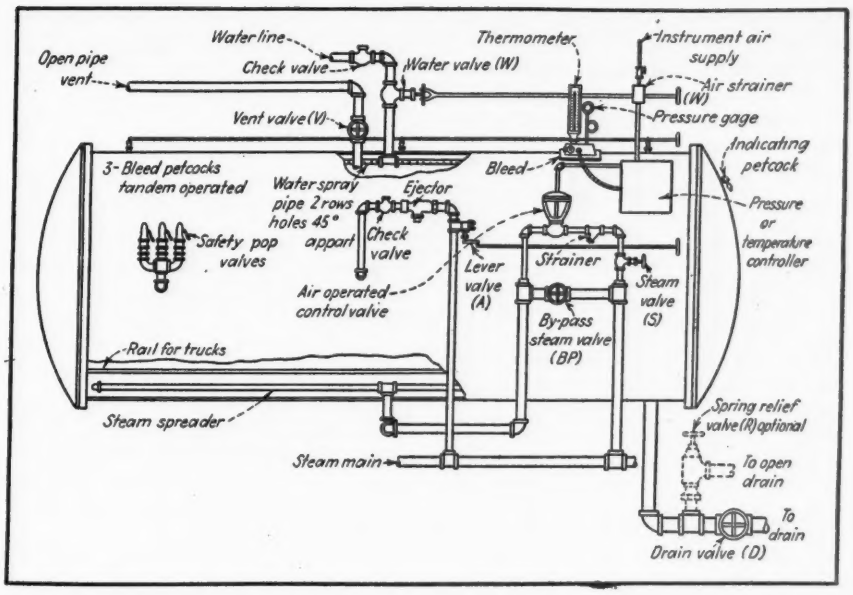

FIG. 2. Horizontal retort equipped for pressure cooling by use of steam-injected air.

Pressure Cooling With Steam and Water

This method is used to a considerable extent in the industry because it does not require installation of compressed-air or steam-ejector equipment as previously pointed out. It is not recommended, however, for cooling products susceptible to damage by overcooking because it is not adapted to fast cooling.

The name of the method may lead one to think that steam is one of the cooling media. Actually, steam is used only to maintain pressure in lieu of air; all cooling is provided by water. With this method, it is necessary to admit water at the bottom of the retort so that it will be separated from the steam by a layer of hot water. If cold water were introduced at the top, it would quickly condense a large quantity of steam, causing a substantial, if not a complete, loss of pressure in the retort with resultant buckling of some, if not all, of the cans in the retort.

During the process, it is necessary that processing steam be admitted to vertical retorts at the bottom as illustrated in Fig. 4, rather than from the top as is sometimes done when compressed air is available. The reason for this is that it is desirable to provide a layer of hot water in the bottom of the retort during the cook to serve as a cushion between the steam and cold water when cooling is started. If steam is not introduced at the bottom, this water layer may exist at a temperature lower than that of the steam in the retort, with danger of understerilization of bottom cans which are immersed in it. Introducing steam through this water layer will keep it hot, or stating this more accurately, at saturation temperature. With careful manipulation, the steam condensate from the process will provide an adequate hot-water layer, but most operators prefer to start the process with some water in the bottom of the retort.

Figure 4 illustrates a vertical retort hooked up for pressure cooling by the steam and water method. Presuming that the process on a retort load of cans is completed and they are ready to be pressure cooled, the following instructions apply:

1. Close all bleeds except the one on the thermometer pocket. This will show when the water level is approaching the top of the retort.

2. With valve S open and valve BP

closed, open valve *P*, admitting steam into the top of the retort. It is advisable to raise the controlled pressure slightly to insure that the cooling pressure always will be above the processing pressure. If temperature control is used rather than pressure control, the retort pressure will have to be regulated by hand by manipulation of valves *BP* or *P*.

3. Close valve *B* which has admitted steam during the process.

4. Open valve *W*, admitting water into the bottom of the retort. Care must be taken not to admit water too rapidly at first or the cold water will break through the hot water layer and cause a sudden pressure drop by condensation of the steam. Permit the water to enter retort through the water valve *W* as rapidly as possible without causing a pressure drop.

5. The steam valves *S* and *BP* should be closed as soon as the pressure can be maintained by the incoming water.

6. As the water level in the retort approaches the top, as indicated by a bleed cock, the water inflow should be reduced and a close watch of the pressure gage should be maintained. It may be necessary to relieve excess pressure through overflow valve *O* as the water level rises in the retort.

7. The pressure will show a sudden increase when the retort becomes filled, and the overflow valve *O* should be opened to relieve the pressure, but not sufficiently wide so that the pressure drops below the processing pressure. The spring relief valve *R*, if used, will be a material aid to control of the pressure at this point.

8. Having filled the retort from the bottom, it is best to reverse the flow of water, admitting it at the top and draining it from the bottom for more efficient cooling. This is accomplished by opening valves *B*, *P* and *D* and closing valves *C* and *O*. The manipulation of these valves should be done carefully so as not to cause a sudden change in retort pressure.

9. The pressure-cooling cycle is completed by reducing the pressure either through decreasing the inflow of water or increasing the outflow at a rate determined to be satisfactory for the particular conditions involved.

10. If the cans are to be completely cooled in the retort, the retort pressure should be held at 1 or 2 lb., after the internal can pressure is dissipated, for the duration of the cool.

Pressure Cooling With Water Only

As stated previously, this method has only a limited application for cans because steam is the preferred method of processing with these containers. There are certain special cases where it is desired to process under a pressure higher than saturated steam pressure, in which case water processing is the only feasible method. Pressure cooling presents no special problems with this method. It is simply a matter of turning off the steam, admitting cooling water and controling the retort pressure by throttling the water inlet and outlet valves. A more uniform cool can be obtained if the water is admitted at the top and discharged from the bottom of the retort.

Equipment

A detailed discussion of retort equipment is beyond the scope of this paper. Figures 2, 3 and 4 are illustrative of economical retort hookups that have been found satisfactory for processing and pressure cooling. Instruments for various degrees of automatic control during the pressure-cooling cycle are available. In general, instrumental control and recording are more efficient and more foolproof than manual control. The degree of instrumentation which is economically desirable for any particular installation will depend upon a number of factors, especially the extent of use per year.

If manual control is employed, spring relief valves, as illustrated in Figs. 2, 3 and 4, will be of considerable value in minimizing the chance of paneling cans by hydraulic shock. Such a valve set at a few pounds above processing pressure will assist in preventing the pressure from rising to too high a level if the operator does not open the drain valve quickly enough when the retort becomes filled with water. If a spring relief valve is used, it will replace part of the safety-valve requirement for the retort.

Where compressed air is used, it is particularly important to be sure that the compressor and receiver (compressed-air storage tank) are of adequate capacity to supply air as fast as it will be required. Allowance should be made for cooling two or more retorts simultaneously unless the plan of operation is such as definitely to preclude this possibility. Steam ejectors should also be of adequate capacity, and allowance should be made for the effect of any loss in steam pressure on the capacity of the ejector at the time that it is to be used.

Provision of adequate steam supply lines, valves, steam spreaders and vents is essential for proper processing and has been covered in other articles. In this connection it is also important that the proper sizes and types of valves be used in the pressure-cooling hookup. Where it is important to minimize flow resistance and throttling is not required, gate valves and not globe valves are indicated. Examples of these indicated gate valves illustrated in the accompanying drawings are: drain valve *D*, stop valves *C* and *B*, vent valve *V*, air valve *A* and lever valve *A*. When the resistance to flow in a line is of no particular importance and throttling is required, globe valves are indicated. Examples of proper application of globe valves illustrated in the accompanying drawings are: air relief valve *AR*, bypass valve *BP*, steam valve *P* and water valve *W*. The water valve *W* would be of the gate type were it not for the requirement of close throttling service in this particular application.

Two common errors in hooking up retorts are the installation of unsuitable control instruments and inadequate safety valves. The former may be the result of failure to give the instrument supplier accurate information concerning the service required. The latter may arise from lack of appreciation of the real hazards involved and of safety regulations for unfired pressure vessels. The recommendations of the American Society of Mechanical Engineers or the National Safety Council should be studied.

Cooling Schedules

The cooling schedule, or the rate of pressure reduction to be used in pressure cooling, depends upon the rate of dissipation of the internal can pressure. This, in turn, depends upon a number of things such as type of product, preparation of the product, fill, exhaust, closing temperature and can size, so no universally applicable specific schedule can be given for any given product. A general rule which can be used as a starting point in establishing a cooling schedule for No. 10 cans which have been processed for two hours or more is to reduce the retort pressure, after the retort is completely filled with water, at the rate of 1 lb. per minute, and at the rate of about 2 lb. per minute for products which have received relatively short processes. Revisions can be made from this general schedule as required to set up the optimum rate of pressure reduction for each particular operating condition.

The optimum rates of flow for the cooling water have been found experimentally to be from 180 to 220 gal. per minute for a five-car, 18-ft. horizontal retort, and from 50 to 60 gal. per minute for a three-crate vertical retort, the faster cooling products requiring the higher flow rates.

If some buckles or strained ends are present in a retort load, they may be evidence that the retort pressure was reduced too rapidly or dropped too low at some point during the cool. Paneled cans are evidence of excess external pressure and may indicate that the retort pressure was not reduced rapidly enough or that the pressure had been allowed to reach too high a level at some time during the cool. However, excessive headspace in conjunction with a high closing temperature is also very likely to cause paneled

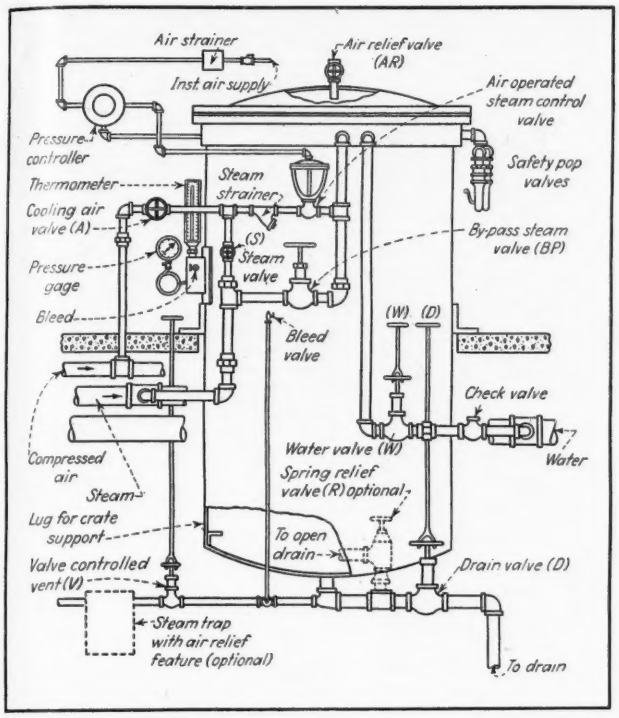

FIG. 3. Vertical retort hookup for pressure cooling with the use of compressed air.

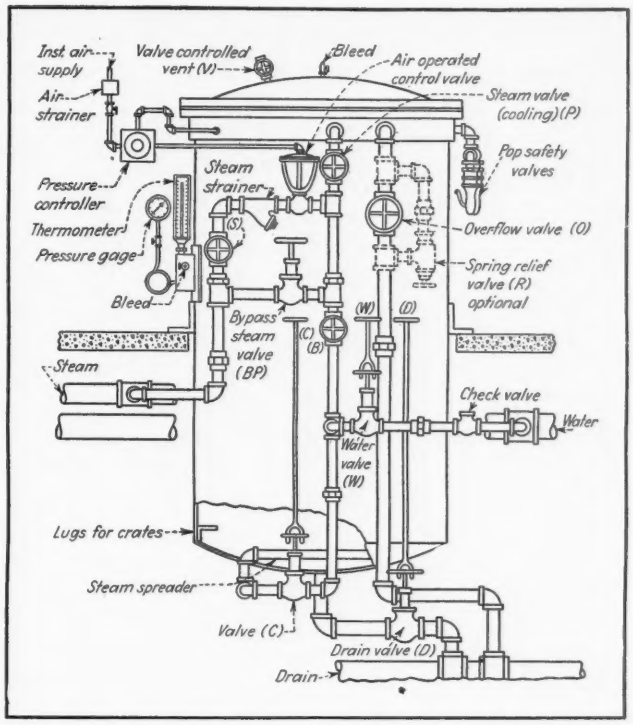

FIG. 4. Vertical retort equipped for pressure cooling with steam and water.

cans, irrespective of the pressure-cooling schedule used. Similarly, cans which have been improperly exhausted or closed at low temperature may have buckles despite satisfactory cooling procedures.

Common Errors In Pressure Cooling

Failure to safeguard the continuity of the supply of water, air or steam to the retort is sometimes encountered. Some canners provide a top steam connection and bottom water connection to retorts piped for cooling with compressed air so that the steam and water method can be used in case of sudden failure of the air supply. Proper precautions should be taken against reduction in the supply of air, water or steam due to drain on these supplies in other plant operations.

It is not uncommon for an operator to vent excess pressure from a flush-fitted top vent as the retort fills with water. The result is that the retort fills completely with water and at the instant of being filled suffers a hydraulic shock. The pressure will rise very suddenly to almost the water-main pressure, and paneled cans may be the result. This may be avoided to a large extent by relieving the excess pressure through the overflow valve O for a hookup such as in Fig. 4, or through a vent V or air-relief valve AR piped as shown in Figs. 2 and 3 with a nipple extending a few inches down into the retort. When air is used for maintaining pressure, the water level will not rise above the overflow outlet if the top bleeds or vents are kept closed. The volume of air in the dome or top of the retort will serve as a cushion, absorbing any hydraulic surges, and the pressure will not fluctuate widely. If air has not been used for cooling, this cushion will consist largely of steam, which will condense as the water becomes cooler. However, it will still be effective in absorbing hydraulic shock while the surface water is hot, so it is just as important in this case not to open the top bleeds or vents.

Water should never be admitted at the top of the retort when the retort is full of steam unless compressed or injected air is available, and even then it should be admitted quite slowly at first.

If air is not available, the retort should be completely filled from the bottom. The reason for this precaution is, of course, to prevent condensation of a large volume of steam with resultant pressure loss.

Another common error in pressure cooling is failure to make allowance for the different cooling rates existing with different products. The pressure-reduction schedule should be established for each different product, and the canner who uses, or tries to use, the same cooling schedule for whole grain and cream style corn, for instance, is apt to have trouble.

A tendency is often noted to make radical changes in the pressure-cooling procedure in an attempt to prevent buckles or panels before making any check on other parts of the canning procedure. For example, buckled cans may be due to improper blanching, overfilling or inadequate thermal or mechanical exhausting before closure, while paneled cans can be caused by failure to vent properly during the retort come-up, or, especially in vacuum packed products, to too rapid a come-up time. Such possible lapses in technic should be eliminated as causes before any radical changes are made in a cooling schedule, particularly one which previously has given entirely satisfactory results.

Perhaps the most common error in pressure cooling is admitting water to the retort too fast immediately after the cooking period ends. This will invariably result in a loss of pressure, perhaps even the formation of a vacuum in the retort, with inevitable buckling of the cans. Avoiding this condition with any method or with any retort simply requires alertness on the operator's part in admitting water at a sufficiently slow rate so that steam will not condense faster than its volume can be replaced with air, water or other steam. If automatic control valves are available on the water, air and overflow lines, this will not occur with proper functioning of the diaphragm valves. If this additional equipment is to be installed, the manufacturer's recommendations for installation and operation should be followed.

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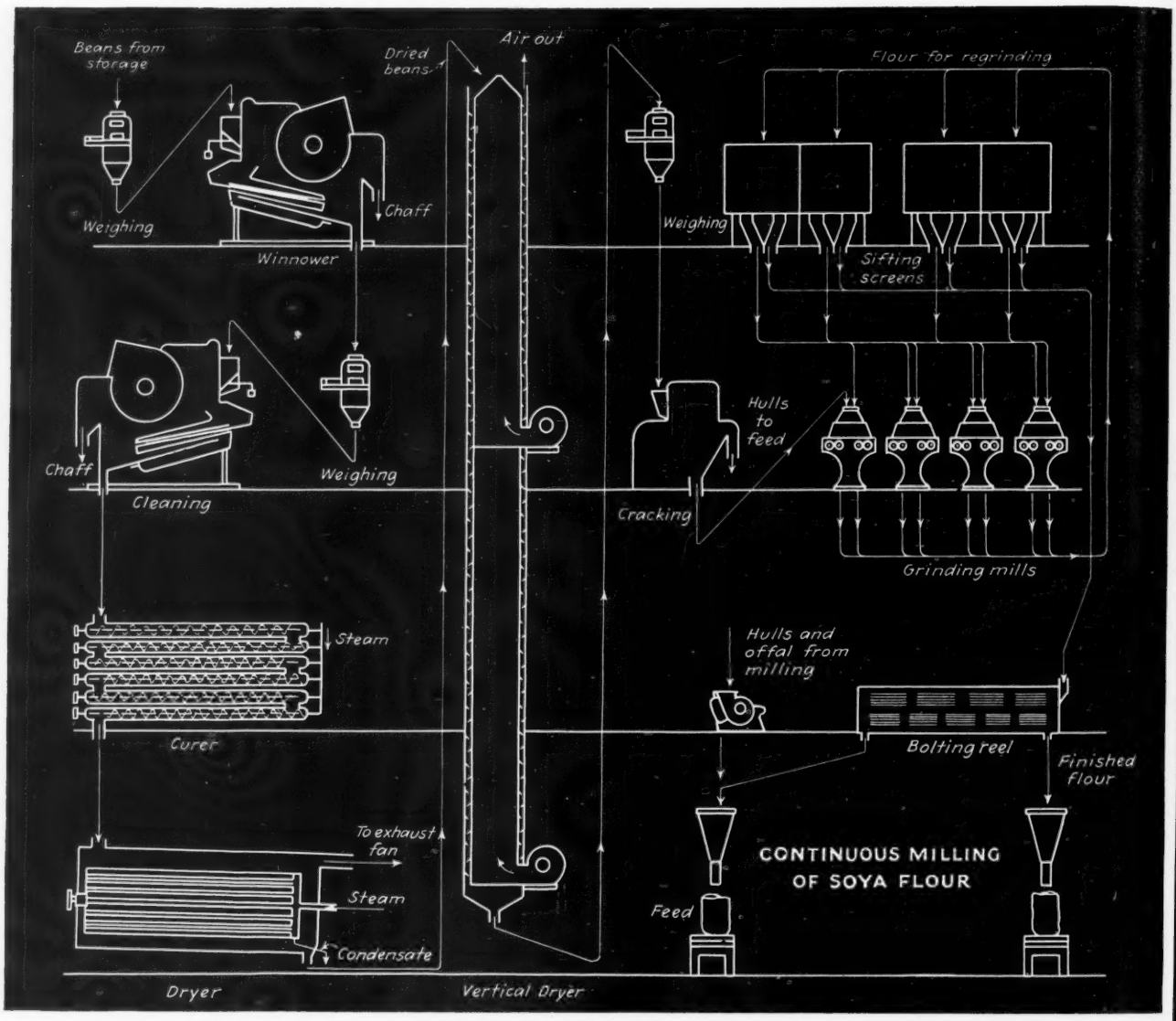


Flow sheet of soya flour manufacturing process.

Converts Mill to Soya Flour

With exception of curing and drying units, same equipment is used as for wheat flour. Problems peculiar to product have been solved

By GRACE HIGHTOWER, Assistant Editor, "Food Industries."

SOYA flour is being produced continuously in a typical small flour mill, 25 years old, at Hagerstown, Md. Except for the curing and drying units, most of the equipment is just as it was when the mill handled wheat.

The mill has been running full time for about a year and a half, and the difficulties due to the characteristics of the beans and the flour have been ironed out. Production is about a carload a day of 80 percent recovery flour, most of which goes to the government for Lend-Lease.

The background of the operation is interesting, because this is a development which has combined high technical requirements with a great deal of practical mill sagacity. The influence of the bacteriologist is seen in the rigid standard of cleanliness in the plant. Not only is there a minimum of dust and disorder, but any slight off-odors are traced and the source removed promptly. Even where hot wet beans are handled there is very little "bean" smell. Heat treatment of the beans is done under the Horvath patents, supervised by the patentee. But the plant operations are in the hands of men who for many years ran flour mills, large and small, and they have brought the milling along until now it is actually a 24-hour, seven-day-a-week, operation.

The accompanying flow sheet shows

the sequence of processing steps and also follows the distribution of operations on the four floors and basement of the plant. It will be seen that only the curer and dryers depart from standard mill arrangements.

The small Manchu yellow soybeans are used. The beans as received run about 14 percent moisture, and the flour is sold under a contract calling for about 7 percent moisture. Moisture is determined on each batch of incoming beans by immiscible solvent distillation. It has been found that a heavy machine oil can be used in place of toluene in this case.

Beans are taken direct from freight cars over automatic scales to the storage bins. With the present production schedule it is necessary to maintain bean storage at about 35,000 bu. The beans are stored in pressure bins and turned frequently. They can be stored for an indefinite period of time, if necessary, but in practice they are held only a few weeks, because of storage-capacity limitations.

All conveying equipment is of the regular flour-mill type, with enclosed inclined bucket elevators and galvanized-iron gravity chutes. Belt drives are used throughout the plant, with one very large electric motor providing most of the operating power.

The beans from storage are run through a preliminary cleaner, or winnower, and a separator. These are big old-style Robinson type blowers and screens. The cleaned beans are weighed with a Richardson Scale Co. automatic scale of 4-bu. capacity, and then are cured.

Curing Process

The "curer" subjects the beans to steam at a little above atmospheric pressure. There are three curing units, each consisting of a vertical bank of six 9-in. tubes equipped with helical conveyors and steam connections, so that the beans travel slowly through the steam chambers, a total distance of about 70 ft., while being constantly stirred and turned over. The beans travel through the curer in slightly less than 45 minutes.

The cured beans then go through the dryers, first through a horizontal unit where they are tumbled over pipes heated with 80- to 90-lb. steam while having air drawn over them, and then through a vertical unit which brings the moisture down from 11 to about 9 percent, and cools the beans to about 70 deg. F.

At Hagerstown, two different types of horizontal dryers are used, but there is no essential difference in operation and they are used in parallel. Either does an adequate drying job.

One is an old grain dryer about 15 ft. long, rebuilt. There is an outer shell which has an air inlet along the bottom and an exit duct along the top. Air is drawn off warm, but not hot, probably at about 100 deg. F. The stirring mechanism consists of 1¼-in. pipes set in a rotating squirrel-cage about 3 ft. in diameter. This has an iron cover around all but 30 deg. of its circumference. It rotates at 2½ r.p.m. Inside each 1¼-in pipe is a ½-in. pipe to which dry steam at 80 to 90 lb. gage is admitted through one trunion and a header. Beans are fed in at one end and tumbled over. They move along because of the slope. The time in the dryer can be controlled by jacking up or letting down one end to adjust the slope.

The other dryer is smaller, built at home especially for the job. The outer shell, 3 ft. in diameter and 12 ft. long, revolves, and the heating tubes remain stationary. There are vanes on the inside of the rotating shell to provide stirring. Temperature and pressure conditions are the same as for the large dryer.

55-ft. Vertical Dryer

The vertical dryer is 55 ft. high. Beans hot from the first dryer, and with about 11 percent moisture, are put in at the top and move slowly down through an annular space 4 in. wide between a central circular air duct and the outer shell. The outer shell is 3½ to 4 ft. in diameter. The rate of flow of the beans is controlled by vanes on both the shell and the air duct. There are two temperature zones. In the upper half, air at 135 to 140 deg. F. is used. In the lower half air is at normal temperature. In both sections the air is admitted to the central chamber or duct at the bottom and forced out through slots under each of the fins.

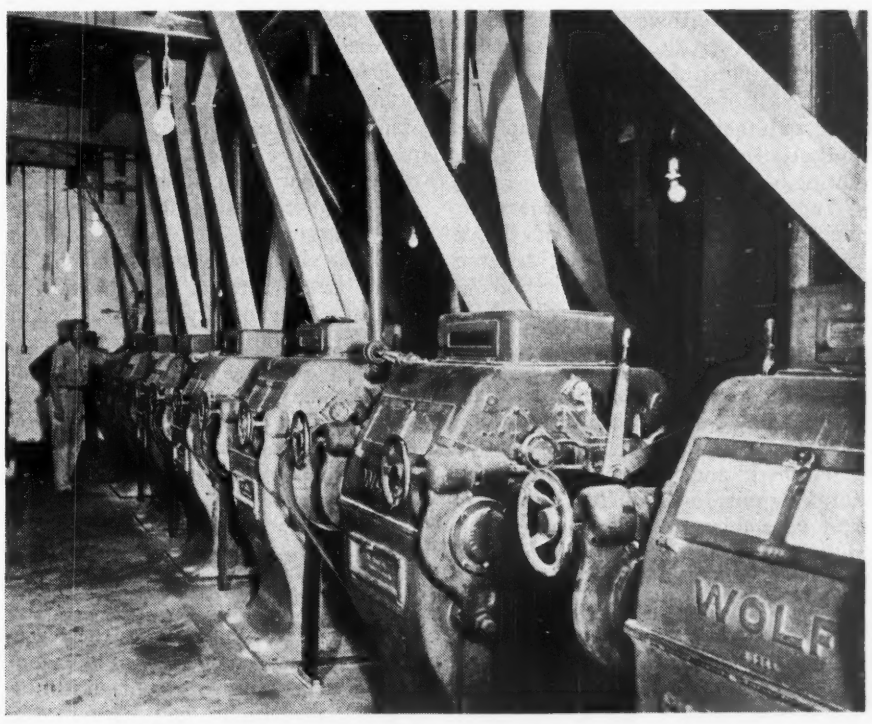
The steamed and dried beans, with about 9 percent moisture, go through a stoner, over another automatic scale, and then to the grinders. The cracking roll somewhat flattens the beans, which are soft at this stage. Hulls come off clean. This stream is passed through an old grain separator. From this point on all the hulls and chaff go to the feed mill. The hulls must be put through a hammer mill before grinding for feed.

Seven double-stand grinders are used, with one crushing pass and 13 milling passes. The flour is handled just as wheat is. There are two 60-frame bolting machines in use.

In the beginning screens were used on all the frames, but recently cloths have been used experimentally and they are expected to be put on regular production. Success in using cloths, or for that matter in continuous bolting at all, is dependent not only on the cure but on the drying process. If the beans come through improperly dried, the flour builds up on the screens and cannot be handled at all.

The flour in the finished stream passes through a reel and by gravity to a pair of baggers.

Shipment is mainly in 100 lb. paper-lined jute bags.



Battery of seven two-stand grinders now used for milling soya flour.

Cucumbers have been salted successfully for many years. They have been stored outdoors, as shown here.

Wartime Vegetable Salting

Old method of preservation revived, with improvements, to help meet food demands. The author describes the process in detail in this article, discussing the dry salting and brine methods

By F. W. FABIAN, Michigan State College, East Lansing, Mich.

MORE vegetables were salted commercially during 1943 than in any previous year since canning became a commercial industry. In Michigan two companies salted over a 1,000,000 lb. of vegetables. Estimates from the Pacific Coast are that 10,000,000 lb. of vegetables was salted in the Pacific Northwest alone. While no accurate statistics are yet available on the amount of vegetables salted in other parts of the country, correspondence with many commercial companies indicates that the volume preserved by salting is large.

Salting of food, such as vegetables, meat and fish, is not a newly developed method of preservation. Rather, it is a very old and time-tested method. It was the only method of preserving food except drying prior to the advent of canning. Freezing was used only to a limited extent, except in certain parts of the world, because of lack of mechanical equipment.

Farmers and commercial packers formerly put down all their meat, fish and vegetables in salt. Most people depended upon the brine barrel for their food supply in the winter. Even today, great quantities of pork and some beef are salted, and in some parts of the country, such as in the mountainous regions of the South, vegetables are salted rather than canned by the housewives.

There are two general methods of salting, the dry and the wet or brine methods. Each has advantages and disadvantages. Likewise, the concentrations of salt used vary with the vegetables and the storing conditions.

The dry method of salting, both with low and high concentrations, is applicable to certain vegetables, especially the leafy type which contain sufficient juice to produce enough brine to cover them. Possibly the outstanding example of this type of salting is cabbage which is shredded and placed in barrels or tanks with 2½ percent of salt evenly distributed throughout.

Other leafy vegetables, such as turnip greens, lettuce, spinach, and the like, also may be dry salted. Certain kinds of vegetables such as cucumbers, green tomatoes and peppers, which have a tough skin and a soft inside, are more or less completely collapsed by the drastic action of dry salt and should be preserved in brines.

Low percentages of salt which permit fermentation may be used in dry salting. The range is from about 2½ to 5 percent. Distribution of the salt evenly throughout the vegetables is very important. Tamping the vegetables as they are placed in the containers helps remove the air and bring the salt in intimate contact with the vegetables, thereby producing the maximum amount of brine in the shortest possible time. If salted in open containers the vegetables should be weighted at the rate of about 10 lb. per 5 gal. of vegetables. To have sufficient brine to cover the vegetables completely as soon as possible is also important to prevent spoilage. In case sufficient brine is not produced by the action of the salt on the vegetables, additional brine should be made to cover them by adding ¼ lb. of salt per gallon of water. The vegetables should be completely covered with brine at all times to prevent spoilage.

High dry-salt concentrations are used for vegetables in which no fermentation is desired. Corn, peas and green lima beans are examples of vegetables that may be so salted. The amount of salt is usually 20 percent or more. A common formula is from 20 to 25 lb. of salt per 100 lb. of vegetables. The larger amount of salt is recommended unless the vegetables are to be held in cold storage until used. We must emphasize again that the even distribution of salt throughout the vegetables and tamping (also weighting when open containers are used) are important to prevent spoilage. Likewise, the vegetables should be covered with brine at all times. If additional brine is necessary to cover the vegetables, it may be made by adding 2 lb. of salt per gallon of water.

Commercial Dry Salting

In commercial practice a large rotating wooden cylinder about 3 ft. in diameter and 8 to 10 ft. long is fitted with baffles on the inside. This cylinder is placed at a 25- or 30-deg. angle and driven by gears so that it rotates slowly. The blanched vegetables and salt are fed in at the upper end at the rate of 20 to 25 lb. of salt per 100 lb. of vegetables, and by the time the mixes come out at the lower end they are thoroughly blended. They are then put into barrels and tamped, after which the barrels are headed and placed in cold storage.

Our own experience with dry salted vegetables is that they do not keep as well as brined vegetables at room temperature unless the salt is thoroughly mixed and the vegetables compressed. Otherwise, there are always some areas in which the salt and vegetables have not been thoroughly mixed, and before sufficient brine is produced spoilage occurs. Some vegetables, such as peas, turn white unless submerged in brine even though there is sufficient salt to preserve them. Vegetables, which do not contain much water or do not readily give up their water, do not make enough brine to cover them and are not suitable for dry salting.

The foregoing objections can be overcome by tamping the vegetables to remove the excess air and facilitate brine production by a more intimate contact of the salt with the vegetables. Placing the vegetables in cold storage is additional insurance against spoilage.

The advantage of dry salting is that the vegetables weigh less per unit of volume than the brined product. Vegetables salted with low percentages of dry salt may be cooked without freshening (desalting) while those packed in high percentages of dry salt may be used in soups without freshening, to salt the soup, provided too many are not used at one time.

Brining Vegetables

The concentration of salt used in brining is the same as in dry salting. The only difference is the method of application. The easiest and simplest way to brine vegetables is to make a brine containing the desired concentration of salt; weigh and place the vegetables in the container; cover the vegetables with brine and add sufficient salt per 100 lb. of vegetables to compensate for the water in the vegetables.

The following simple formula has been derived to determine accurately the amount of salt to add to each 100 lb. of vegetables to compensate for the water present in them.

$$X = \frac{A \times S}{100 - S}$$

X = Weight of salt in pounds per 100 lb. of vegetables.
A = Percent of moisture in vegetables. (Obtain this from a table giving their chemical composition.)
S = Percent of salt desired in the finished brine.

The advantage of the brine method is that the brine immediately surrounds every particle of food, thereby subjecting it to the action of salt.

The disadvantage is that the water added to the vegetables in the brine is just that much extra weight and cannot be used. When the vegetables are used, the brine must all be discarded, carrying with it some of the soluble nutrients.

However, certain vegetables, such as cucumbers, peppers, tomatoes, cauliflower, onions, and the like, must be salted in brine because of their structure or lack of juice.

Our work[1] with corn, green string beans, peas and green lima beans, as well as the work of Etchells and Jones[2] with green beans, showed that blanching improves the flavor of the vegetables when cooked. Unblanched vegetables when desalted and cooked have a woody flavor similar to unblanched frozen or dehydrated foods. Fabian and Blum[1] demonstrated that salting does not destroy catalase or peroxidase, therefore, one would expect to find this same flavor in unblanched, salted vegetables as in unblanched frozen or dehydrated foods. Therefore, vegetables for salting should always be blanched for best flavor retention. Steam blanching is preferable to hot-water blanching because it removes less soluble nutrients. The blanching time by either method should be sufficiently long to inactivate the peroxidase present in the vegetables. This process requires 3 to 5 minutes at 212 deg. F.

Effect of Brining On Fermentation

Salt has a selective action on bacteria. It permits certain acid- and gas-producing bacteria, as well as true and false yeasts, to grow while inhibiting or suppressing certain spoilage bacteria. The acid-forming bacteria soon produce sufficient acid to supplement the preserving action of salt. The acid thus produced must be conserved by placing the brined food in completely filled, closed containers or by pouring hot paraffin over the surface of the brined food to prevent the growth of scum yeast which oxidizes the acid.

The type of vegetables which can undergo fermentation is in general the same kind as that normally used in salads when fresh, such as cabbage, cucumbers, tomatoes, and the like. These vegetables are improved by vinegar or the acid in salad dressing.

Lactic acid fermentation enhances the flavor of certain vegetables and injures the flavor of others. Corn, green string beans, okra, cabbage, cucumbers and tomatoes can be fermented without detracting from their flavor. The onion is an example of a vegetable that cannot be fermented because of the injury to its texture. Vegetables such as peas and green lima beans cannot be fermented because of their high protein content. Putrefaction rather than lactic acid formation occurs if the

Suggestions for Salting

Here are a few suggestions for those salting vegetables either by the dry or the brine method.

1. Blanched salted vegetables have a better flavor than unblanched salted vegetables. Therefore, they should be blanched, preferably in steam, 3 to 5 minutes at 212 deg. F. to inactivate the enzymes.

2. Vegetables should be stored in clean barrels, crocks or tanks. If wooden vessels are used, they should be paraffined on the inside.

For commercial purposes, storage in closed paraffined barrels which are completely filled is the most satisfactory method.

3. All vegetables, whether salted dry or wet, ultimately should be completely covered with brine. If salted in open containers, they should be weighted so as to immerse the vegetables completely. The tops of such containers should then be covered with about one inch of paraffin to prevent scum formation and evaporation.

4. Whether the dry or brine method of salting is to be used depends upon the kind of vegetables to be salted. The amount of salt to use depends upon the vegetable, the temperature of storage and whether fermentation is desired or not.

5. Some vegetables can be fermented without injury to their edibility; others are spoiled by fermentation.

6. Salt exerts a selective action on bacteria. In general 2.5 to 5 percent of salt permits rapid fermentation. Larger amounts, up to 15 percent, decrease the rate of fermentation. A concentration of salt greater than 20 percent is required to prevent spoilage.

salt content is too low. This is analogous to meat and fish in which the salt content must be sufficiently high to prevent fermentation.

The amount of salt to add depends upon whether fermentation is desired. Fermentation will take place until approximately a 15 percent salt concentration is reached and spoilage will occur until more than 20 percent of salt is present. The amount of salt to add to suppress spoilage bacteria and permit large numbers of lactic acid-producing bacteria to grow is from 2½ percent in the case of cabbage for sauerkraut to 5 percent for cucumbers used in making genuine dill pickles. Higher concentrations of salt permit fermentation but much more slowly.

Effect of Salting On Vitamin Content

Studies made[2,3] on the loss of vitamins during salting show that the losses vary for different vegetables and the various methods of salting. In general, blanched vegetables show a greater loss of vitamins A (carotene or provitamin A) and C (ascorbic acid) than do unblanched vegetables. During the freshening process, however, the reverse is true, so that if the vegetables were freshened the vitamin content of the blanched and unblanched vegetables would be more nearly equalized.

Since vitamin C is water soluble, there is always a greater loss of vitamin C than vitamin A during salting and freshening. Vitamin C retention is very poor. In most cases this vitamin practically disappears during the salting and freshening processes. Salting and storing vegetables in closed containers, thereby excluding air, conserves vitamins A and C.

The loss of vitamin A varies for different vegetables. Work done to date shows, in general, that there is a good retention, greater than 50 percent, of vitamin A in peas, corn, carrots and cucumbers; fair retention—less than 50 percent—in the case of green string and lima beans and the leafy vegetables such as turnip and mustard greens, spinach and kale. The procedure used in salting and storing likewise influences vitamin A retention, just as in the case of vitamin C, but to a less marked degree than for vitamin C.

Just as salting and brining have a varied effect upon the vitamin content, they also have a varied effect upon the color and physical appearance of vegetables.

Vegetables packed in low salt concentrations tend to bleach and become light in color, whereas those packed in high salt concentrations show less loss of color. Even beets retain a large percentage of their red color when salted in 20 percent brine. It was thought that nearly all the color would bleach out of them but such was not the case.

A modified Blair process and also hexa-metaphosphate were used in 1943 in salting peas and string beans to determine the effect on color retention. This work will be reported later.

The texture of all the vegetables was good. There was practically no breakdown or tissue disruption. All were whole and presented an attractive appearance. The blanched samples were more tender than the unblanched even after cooking.

Practically no work has been done on the best kind of vegetables to salt. Etchells and Jones[3] found a very great difference in the tenderness, even after cooking, of two varieties of beans—Tendergreen and Black Valentine Stringless—picked at the same time and salted under the same conditions. The Tendergreen variety was entirely satisfactory, whereas the Black Valentine Stringless variety was extremely tough even after prolonged cooking.

This would indicate that, in the case of string beans at least, there is a difference in the desirability of varieties for salting. This is analogous to the situation in freezing and dehydrating, where the good canning varieties are not always the best to use.

One of the questions most frequently asked in connection with salted vegetables is, "Are they fit to eat?". Experiments[1] with corn, green string beans, peas and green lima beans show that the first two vegetables named were comparable in every respect with similar vegetables canned at the same time from the same lot. Peas and the green lima beans while edible were considered inferior to similar lots canned at the same time. Leafy vegetables, such as cabbage and greens, which have undergone fermentation have a flavor different from that of the original vegetables, but one that most people like.

Our results show that most of the vegetables can be desalted within a reasonable time by placing them in running water, or by changing the water on them several times, after which they are ready for cooking. The flavor of the cooked vegetable is greatly improved by the addition of the approximate amount and kind of sugar and acid withdrawn by salting. The sugar and acid can be added to suit the taste of the cook.

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TABLE I—Suggested Salt Treatment for Various Vegetables[1]

Vegetable	Salt Applied[2] Dry, percent A*	Dry, percent B**	Brine, percent A*	Brine, percent B**	Remarks
Beans					
snap	5.0		10.0	20	Can be fermented or not
lima-green		20		20	Low salt concentration permits putrefaction rather than acid fermentation
Beets			4.0	20	Lose some color. Cut lengthwise rather than crosswise
Carrots			6.0	20	Can be fermented or not
Cauliflower				20	Should not be fermented. Softens in low salt concentration
Corn—whole kernel or cob	10.0	20	10.0	20	Can be fermented or not
Egg plant				20	Softens in low salt concentration. Excellent in high concentration
Greens					
beet	5.0		5.0		Fermentation not injurious to product
chard	5.0		5.0		Fermentation not injurious to product
dandelion	5.0		5.0		Fermentation not injurious to product
kale	5.0		5.0		Fermentation not injurious to product
mustard	5.0		5.0		Fermentation not injurious to product
spinach	5.0		5.0		Fermentation not injurious to product
turnip	5.0		5.0		Fermentation not injurious to product
Kraut					
cabbage	2.5				Fermentation desirable for flavor
lettuce	2.5				Fermentation desirable for flavor
turnip	2.5				Fermentation desirable for flavor
Onions				20	Fermentation loosens layers of onion
Okra			10.0	20	Can be fermented or not
Peas		20		20	Fermentation undesirable. Low sal concentration permits putrefaction rather than acid fermentation
Pickles					
cucumbers					
genuine dill			4.5		Fermentation desirable for flavor
overnight dill			4.0		Fermentation desirable for flavor. Store at 36–38 deg. F.
Kosher dill			4.5		Fermentation desirable for flavor
salt stock				16	Start at 10 and raise to 16 percent salt within 6 to 8 weeks
Tomatoes—green					
dill			4.5		Fermentation desirable for flavor
salt stock				16	Start at 10 and raise to 16 percent salt within 6 to 8 weeks
Tomatoes—ripe			4.0		Fermentation desirable for flavor

*A = With Fermentation.
**B = No Fermentation.

[1] All vegetables containing less than 16 percent salt will freeze during the winter in the Northern climate. Vegetables containing less than 16 percent salt should be stored at temperatures ranging from 36 to 50 deg. F.

[2] All percentages of salt given are final concentrations after the vegetables and brine have reached equilibrium.

Sulphite Retards Deterioration Of Dehydrated Cabbage Shreds*

By G. MACKINNEY and L. B. HOWARD, Division of Fruit Products, University of California

Recent Quartermaster Corps specifications for dehydrated cabbage include a requirement for sulphiting, prior to dehydration, with limits of 750 to 1,500 p.p.m. of sulphur dioxide in the finished product

DEHYDRATED cabbage normally has to be stored for several months prior to consumption, frequently at temperatures of 90 deg. F. or higher, and it becomes unpalatable under such conditions. Sulphiting retards this deterioration and offers the most practical known means for this purpose, in the industry as now organized. This does not mean that a sulphite treatment is the only, or even the ideal, answer. Furthermore, deterioration will be retarded, but not necessarily eliminated. Nothing can replace sound dehydration practice, and of all factors studied, proper blanching and low moisture content of the packaged cabbage are the most vital. Sulphiting has one additional advantage in production problems in reducing the danger from scorching, and the cabbage can be dried safely at higher finishing temperatures.

The limits specified were not entirely arbitrarily selected. Fifteen hundred parts per million of sulphur dioxide may be somewhat too high for cabbage which is to be consumed in cooler latitudes, and may prove too low for best quality retention after storage and shipment to the tropics. The upper limit represents, therefore, a compromise between conflicting situations. The true test is not whether one would prefer sulphited cabbage immediately after dehydration, but whether one could tolerate the taste of unsulphited cabbage stored for several months and then shipped to the tropics.

The range permitted is one to which industry can conform in practice. Over one-half million pounds have now been produced at one plant, containing mostly from 1,000 to 1,200 p.p.m., with an outside range from 800 to 1,400 p.p.m. This clearly shows the practicality of the limits specified.

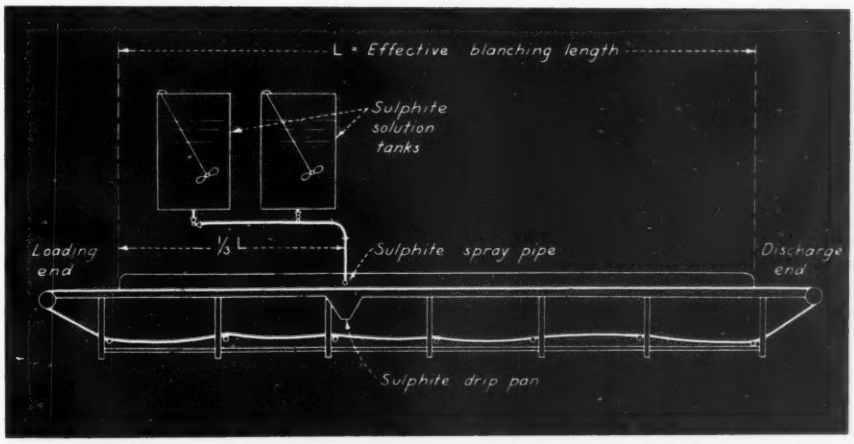
The necessity arose for pooling available information gleaned from laboratory tests, pilot-plant data and industrial tests and translating this to industrial operation. Numerous colleagues and coworkers have necessarily had a profound influence on our conclusions, and we acknowledge our debt to Prof. W. V. Cruess of the University of California, W. B. Van Arsdel, Geo. Hemmeter, A. L. Pitman and H. Campbell of the Western Regional Research Laboratory, and P. H. Richert of the Quartermaster Corps. The cooperation of the industry is also gratefuly recognized. Our purpose in this report is to indicate the scope of the problem and how it has been solved in California plants currently producing dehydrated cabbage under Army contract. The report is in no sense final, but it should be of use to other operators faced with similar problems.

All of the plants in this State handling cabbage have continuous blanchers, with the exception of one which has a cabinet blancher. The continuous blanchers vary from 20 to 75 ft. in length. Three plants have wooden trays, while others use galvanized wire mesh. Each plant, therefore, constitutes a special problem.

Control Through Concentration

The absorption of sulphite is affected by several factors, and the retention by still other variables. Thus, absorption is dependent upon the cabbage, itself, the size of the shreds, the concentration and temperature of the applied solution and the time, i.e., duration of the treatment. Retention, measured so far chiefly by the quantity found in the finished product, is affected by blanching and drying operations. No studies have yet been made which clearly distinguish absorption from retention. Both are incidental to the main point, that the finished product shall contain a specified quantity of sulphur dioxide. The entire control problem in each plant has, therefore, been simplified by the expedient of regulating the concentration of the applied solution.

Variations in the cabbage itself and the size of shreds appear to be of minor consequence in actual operation. An operator who has been consistently producing cabbage containing 1,000 to 1,200 p.p.m. of sulphur dioxide should be able to modify his



Equipment for sulphite spraying cabbage preparatory to drying. Spray nozzles are shown at ⅓ the length, but their exact location must be determined by experiment.

*Contribution from the Division of Fruit Products, University of California, and Western Regional Research Laboratory, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

sulphiting procedure almost immediately, if this seems desirable, because of season, degree of maturity or other conditions. Consistent production at 800 p.p.m., however, would suggest the desirability of modifying a controllable factor to obtain a higher average sulphur dioxide content in the cabbage.

The time, temperature and concentration are three interrelated variables. Procedures could be devised in which time and temperature would be critical. This is not desirable in practice. It must be remembered that sulphiting has had to be introduced into plants already producing dehydrated cabbage, and, to minimize disturbance of established operations, the insertion of this step into the production line has required that one factor be made the means of control. The concentration has been chosen as the readiest and simplest means for accomplishing this purpose.

A final variable is the composition of the solution itself. Practical tests indicate that a solution having a pH of about 6.7 offers relatively few difficulties. At lower pH values, the solution becomes undesirably corrosive. The desired solution can be obtained in several ways. One of the simplest is to mix equal weights of sodium sulphite (Na_2SO_3) and sodium metabisulphite ($Na_2S_2O_5$). One could also add to the latter the appropriate quantity of soda ash. The former procedure has some minor advantage but is slightly more expensive. Although some turbidity is encountered in the tanks, no difficulty has arisen so far from formation of scale.

Method of Application

Most operators have preferred to apply the sulphite solution by sprays rather than to immerse the cabbage in the solution under controlled conditions. If the cabbage has been blanched, either partially or completely, the concentrations required are of the order of 0.2 to 0.3 percent (calculated in terms of SO_2) for sprays and 0.1 to 0.12 percent for dips. If the cabbage is to be dipped cold into the solution at 60 deg. F. prior to blanching a concentration of 0.4 to 0.5 percent SO_2 is required. The more concentrated solutions cannot be applied as sprays without undue waste under present conditions, and to avoid recirculation problems a dip is to be preferred in such cases.

Sprays applied in the blancher, where this is a long, flat or hump-back continuous type, have proved very effective and cause minimum disturbance of flow. Blanchers 50 ft. or more in length should have the spray inserted approximately one-third of the way in from the entrance end. This point is apparently quite critical; this fact may be due partly to the characteristics of the blancher, including the presence or absence of eddy currents, quantity and distribution of injected steam, and ease of maintenance of temperature.

The insertion of a spray curtain had unpredictable consequences in one 75-ft. hump-back blancher, where the temperature on the other side of the hump was actually raised slightly. When the spray was placed one-quarter of the way in, it was quite ineffective. When it was placed at the half-way point, the trays emerged dripping, with consequent tray-staining of the cabbage, and retention was low. In this particular case, the most uniform results and highest retention were obtained with the spray at the one-third mark. With a concentration of 0.23 percent SO_2, the dried cabbage contained from 1,000 to 1,200 p.p.m. of SO_2. With a flat 20-ft. blancher, on the other hand, it was necessary to insert the spray in the middle, and a solution of slightly higher concentration (about 0.29 percent SO_2) was found desirable.

The volume of solution used and the type of spray head selected vary considerably. One operator has used as high as 800 to 900 gal. per hour, but most plants use between 250 and 500 gal. per hour under actual operating conditions. These values represent an application varying from 5.5 to 10 gal. of solution per 100 lb. of trayed cabbage.

Originally, to prevent clogging of sprays, a slotted pipe transverse to the direction of flow of cabbage and stretching across the blancher was suggested. With the slot at the top, a weir-like arrangement was envisaged. The slot was about 1/16 in. wide and had a length of 72 in., corresponding to the length of a tray. This gave an aperture of 4.5 sq.in. It was found difficult to regulate this to give a uniform flow that would not be excessive.

Various types of spray heads are now used. A grid of three or four iron pipes has been recommended. This is drilled with holes 1 in. apart and 3/32 to 5/32 in. in diameter. Each operator has chosen his own method, which accounts for some of the difference in the actual consumption of sulphite. The theory behind the grid was that with the holes in one pipe offset slightly from those in the preceding one, complete coverage of the cabbage would be secured. In one plant, however, it has been preferred to use a single pipe, and this plant is operating very successfully. The holes are at the top, and there is sufficient pressure to cause the jets to hit the top of the blancher and spatter on the cabbage. In this way there is less danger of clogging the holes, which is a more serious problem at this plant because of hard water.

It is not yet feasible to evaluate the relative efficiencies of the different devices, and comparisons would be most difficult because the tunnels and methods of operation differ so materially in different plants. It should be clear from this discussion, however, that an empirical answer can be developed quite rapidly at any plant under its own working conditions, and that the operator can determine the level of SO_2 in his product by careful control of the concentration of the sulphite solution.

Cold-dip Procedure

Numerous experiments have been made with cold dips, applied prior to blanching, to determine a suitable procedure where cabinet blanchers are used. It has been found that absorption of sulphite, as gaged by the amount found in the finished product, can be made relatively independent of the duration of dip, provided the sulphite dip is followed by a rinsing dip in cold water. The procedure, then, is to dip a suitable screen basket containing about 25 lb. of shredded cabbage (i.e., one tray load) for 10 seconds in a solution containing from 0.4 to 0.5 percent SO_2; to allow an additional 10 to 15 seconds for the basket to drain; then to immerse it in fresh water for 5 to 10 seconds; after which it is spread on the trays, blanched and dehydrated in the usual way. For this procedure, large troughs of 100- to 200-gal. capacity are desirable.

Mechanical means such as a circular monorail could obviously be devised, but so far the operation has been entirely manual. It is necessary to

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Sulphite Salt Concentrations Required

Treatment	Normality* of solution	Percent SO_2	Approximate** percent as salts	Weight in pounds of salt mixture per 100 gal.
Spray in blancher, long type	0.072	0.23	0.46	3.8
Spray in blancher, short type	0.090	0.29	0.58	4.8
Cold dip	0.156	0.5	1.0	8.3

* In terms of 10 c.c. of sulphite solution, titrations of 7.2, 9.0 and 15.6 c.c. of N/10 iodine will be required in the three instances given in this column.

** Liberal allowance is made for the grade of sulphite and for losses.

Dehydration's Critical Year

Dehydrators soon may have to sell to the domestic market. And their products must compete on a quality-cost basis with established foods

By L. V. BURTON, Editor of "Food Industries."

WITH the government as the buyer of 97 percent of the dehydrated vegetable production of the nation and 57 percent of the dehydrated soup mix production, National Dehydrators Association considers that 1944 is the critical year for their industry. For in the opinion of the Association's executives, government purchasing ultimately will begin to taper off and leave the greatly expanded industry dependent solely on the domestic commercial market.

Without any pretense at omniscience, it is our opinion that further important technological developments in the production and packaging of dehydrated vegetables must precede a large peacetime consumer acceptance of the products. Present methods of drying appear to us to be but refinements of a process that is, generally speaking, still a primitive process. To produce dehydrated foods that will compete with the products of older and well-established preservation methods, as well as with fresh foods that are available the year around, by the method of blowing dry, hot air through or across the material, seems to be sending a boy to do a man's job.

Most of the vegetable dehyration industry is less than three years old; freezing is about 14 years old; canning is considerably more than 100 years of age. To develop technics in three years under the stress and shortages of war that will equal the development even of the freezing industry, where a single firm has probably spent more research money in 14 years than the entire dehydration industry has spent on its development work, is not in the cards. But of this we are sure:

An important sector of the dehydration industry will endure long after the war is over, even without further technologic advances. It was here before the war; it will continue after the war. Without further needed advances in dehydration technology, the products that may be expected to enjoy commercial sale in peacetime are those which naturally have a marked characteristic flavor before the drying process removes much of it. Drying removes more than moisture alone. It also volatilizes certain flavors, and herein is its technologic handicap—a problem not faced by freezing preservation, and only very slightly a factor in canning.

Few dehydrators have given much thought to the true function of their products in a peacetime economy. Are dehydrated foods—individual foods—best sold directly to the consumer or are they best suited for sale as intermediate products, as ingredients for other fabricated foods.

Years ago when freezing was wearing short pants we incurred severe displeasure because we admonished that there was no point in freezing a food unless by so doing a better or cheaper job was done than by some other method of food preservation. Yet that philosophy was very sound then. It still is sound today. We urge it as a fundamental thought for all who are pondering the future.

Primitive drying methods can hardly compete with other highly developed preservation methods because they seldom can do a better job, *i.e.*, produce a better quality food. Each man must be a realist and recognize that equal qualities at equal cost can compete, and that equal quality at less cost will have the advantage, be the method, canning, freezing or dehydration. Quality probably will always come first in consumer esteem.

The dehydration industry is one of the first food processing industries to be entirely on its own resources. It has no centuries of prior art, gained by costly trial and error. There are yet no big equipment or container companies that may have all the answers to aid a customer in difficulty. In this respect the dehydrators are in exactly the same situation that the chemical process industries find themselves all the time whenever a new product comes out. Who taught them how to make cellophane, rayon, nylon, synthetic rubber, pliofilm, plastics, butyl alcohol, 100-octane gas or synthetic insulators good enough to compete with existing materials? Nobody taught them but themselves. And it was slow, time-consuming work.

It took brains, technologic skill, research, money—and lots of time. It would be a pleasure to hold out a prospect of an easy future to dehydration, but that would be dishonest. All that one can with honesty promise is work and sweat and tears until processes can be developed that will give dehydrated food a quality that is competitive with that obtained by other forms of food preservation.

Control board for a tunnel dehydrator, including temperature and humidity recorder-controllers. Close control is necessary to the production of quality dehydrated foods. And quality certainly is a must if dehydrated products are to compete with food preserved by older and better developed methods of preservation.

Putting a Watchdog On Your Gasoline

A simple system which provides a record of the amount of fuel received and taken out each day so that none of it is wasted, stolen or improperly charged out

INCLUDED in the operating costs of food trucks is an important item which is becoming more and more necessary to control—gasoline. Because of the short supplies of truck fuels, gasoline is now not only hard to get but is high in price.

A simple and effective system of control to make sure that gasoline is not wasted, stolen or improperly charged out has been devised. This system furnishes management with a daily record of the amount of gasoline received and withdrawn from the tanks. It consists of a basic printed form on which the amount of gasoline on hand at the beginning of each day, the number of gallons received and put into the storage tanks and the number of gallons given out to the various trucks in the fleet are easily recorded. The form is 8½ in. wide and 14 in. long, with printed headings and columns where the data for the day is entered.

On this form a record can be kept of either gasoline or diesel fuels although a separate sheet must be used for each type of fuel distributed through each separate pump.

In operation, the form is placed on a desk or stand as near as possible to the pump where the gasoline is to be drawn out. One sheet a day is used for each pump. When the current day's form is put on the stand, the pump meter reading is written on the sheet, as shown in Fig. 1. As the man in charge of the pump draws out gasoline for one of the trucks in the fleet, he marks down on the sheet, beginning at the left, the vehicle or unit number, the last three figures of the pump meter reading after the gasoline has been taken out, the speedometer reading of the truck at the time the fuel was dispensed and the number of quarts of oil supplied.

This procedure is repeated each time a withdrawal is made. At the end of the day, the sheet is turned into the office where calculations are made to see that all the fuel on hand has been accounted for.

At the time the sheet is removed from the stand, the underground tanks serving the pump are gaged by a stick to determine how many gallons of fuel remain. This information is turned into the office, together with a record of the number of gallons, if any, that have been put into the tanks during the period covered by the sheet. The number of gallons in the tank at the beginning of the day is taken from the closing record of the previous day's sheet.

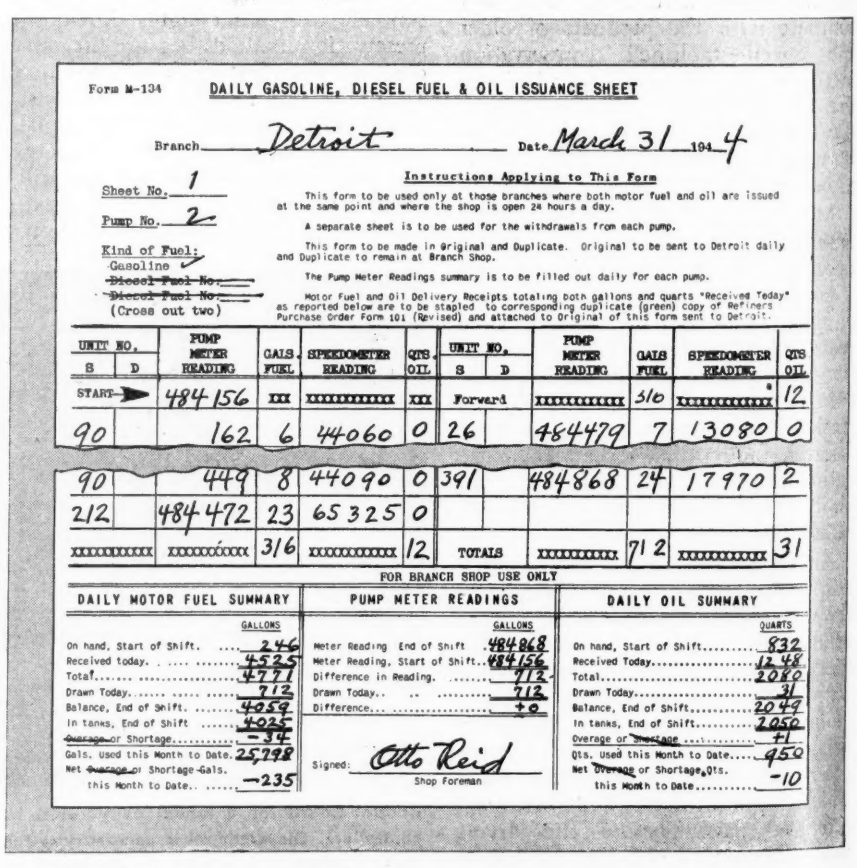
With all the necessary facts thus available, the calculations on the sheets are begun. The first operation is to fill in, in the column headed "Gals. Fuel," the number of gallons that have been given out to each individual truck. These individual gallonage-withdrawal figures are not calculated while the sheet is on the stand near the pump. Instead, they are made in the office by a clerk more skilled in figures than the usual pump attendant.

In Fig. 1, under the heading "Unit No." (vehicle number), there are two columns labeled "S" and "D." The particular sheet illustrated in this article is employed by a large fleet owner who uses principally tractor-trailer units in which "S" stands for "single," meaning a tractor and semi-trailer, and "D" designates a "double," a tractor and two trailers—a semi-trailer and a four-wheeled trailer pulled behind it.

The segregation of the vehicle numbers, like that made between a single and a double, facilitates posting the quantities of fuel used by the two classes of trucks in the company's cost records. When two classes of trucks are not employed, one column for the vehicle number is adequate.

When all the amounts that have been withdrawn for each truck are calculated and marked on the sheets, they are added up and the total compared with the difference between the meter readings at the beginning and at the end of the shift. These totals should be the same. The pump meter readings are illustrated at the bottom center of Fig. 1.

The daily motor-fuel summary, which is found at the left bottom of the form, is filled out next. This is computed by adding the number of



Form M-134 DAILY GASOLINE, DIESEL FUEL & OIL ISSUANCE SHEET

Branch Detroit Date March 31 1944

Sheet No. 1
Pump No. 2
Kind of Fuel:
Gasoline ✓
~~Diesel Fuel No.~~
~~Diesel Fuel No.~~
(Cross out two)

Instructions Applying to This Form

This form to be used only at those branches where both motor fuel and oil are issued at the same point and where the shop is open 24 hours a day.

A separate sheet is to be used for the withdrawals from each pump.

This form to be made in Original and Duplicate. Original to be sent to Detroit daily and Duplicate to remain at Branch Shop.

The Pump Meter Readings summary is to be filled out daily for each pump.

Motor Fuel and Oil Delivery Receipts totaling both gallons and quarts "Received Today" as reported below are to be stapled to corresponding duplicate (green) copy of Refiners Purchase Order Form 101 (Revised) and attached to Original of this form sent to Detroit.

UNIT NO. S	UNIT NO. D	PUMP METER READING	GALS. FUEL	SPEEDOMETER READING	QTS. OIL	UNIT NO. S	UNIT NO. D	PUMP METER READING	GALS. FUEL	SPEEDOMETER READING	QTS. OIL
START →		484156	XX	XXXXXXXXXX	XX	Forward		XXXXXXXXXX	310	XXXXXXXXXX	12
90		162	6	44060	0	26		484479	7	13080	0
90		449	8	44090	0	391		484868	24	17970	2
212		484472	23	65325	0						
XXXXXXXXXX		XXXXXXXXXX	316	XXXXXXXXXX	12	TOTALS		XXXXXXXXXX	712	XXXXXXXXXX	31

FOR BRANCH SHOP USE ONLY

DAILY MOTOR FUEL SUMMARY

	GALLONS
On hand, Start of Shift.	246
Received today.	4525
Total	4771
Drawn Today.	712
Balance, End of Shift.	4059
In tanks, End of Shift	4025
~~Overage~~ or Shortage	-34
Gals. Used this Month to Date.	25798
Net ~~Overage~~ or Shortage-Gals. this Month to Date.	-235

PUMP METER READINGS

	GALLONS
Meter Reading End of Shift	484868
Meter Reading, Start of Shift.	484156
Difference in Reading.	712
Drawn Today.	712
Difference	+0

Signed: Otto Reid
Shop Foreman

DAILY OIL SUMMARY

	QUARTS
On hand, Start of Shift	832
Received Today	1248
Total	2080
Drawn Today	31
Balance, End of Shift	2049
In tanks, End of Shift	2050
Overage or ~~Shortage~~	+1
Qts. Used this Month to Date	450
Net Overage or Shortage, Qts. this Month to Date	-10

FIG. 1. Daily-fuel-issuance sheet which serves as a control over gasoline and oil.

gallons dumped into the tanks during the day to the number on hand at the start of the day. This gives the total number of gallons to be accounted for.

The total number of gallons drawn out is then subtracted from the total number of gallons on hand to start the day. The number of gallons left is the balance on hand at the end of the shift. This total is compared with the amount on hand in the underground tanks. The difference between the two is the overage or shortage.

The number of quarts of oil used each day is figured out in the same manner as the consumption of gasoline, and the daily oil summary is also computed at the bottom of the form.

Where repair shops are not open over a 24-hour period and the drivers are allowed to draw their own fuel from the tanks, another form (see Fig. 2), which is a variation of Fig. 1, is used. To prevent any errors, pump meter readings are taken before and after the gasoline has been drawn from the tank. The total number of gallons used each day and the total number over or short in the tanks are carried forward from day to day, so that at the end of the month the total number of gallons consumed in a month and the total number over or short are indicated.

The balance on hand by calibration and stick measurement very rarely comes out exactly even. The three factors which cause this balance to vary are (1) evaporation in the tanks through the vent pipes; (2) the error resulting from volumetric expansion and contraction of the fuel because of temperature changes; and (3) the error of stick calibration. An error of one-half of 1 percent, however, is tolerated. When the percentage is more than this amount, it indicates that the amount of fuel dispersed should be watched more carefully. This has proved to be an effective check on fuel supplies.

Form M-135 DAILY GASOLINE, DIESEL FUEL & OIL ISSUANCE SHEET

Branch Muskegon Date March 31 1944

Kind of Fuel: ~~Gasoline~~ ~~Diesel Fuel No.~~ Diesel Fuel No. 3 (Cross out two)

Form to be made in Original and Duplicate. Original to be sent to Detroit Daily and Duplicate to remain at Branch.

The Pump Meter Readings summary is to be filled out daily for each pump.

Motor Fuel and Oil Delivery Receipts totaling both gallons and quarts "Received Today" as reported below are to be stapled to corresponding duplicate (green) copy of Refiners Purchase Order Form 101 (Revised) and attached to Original of this form sent to Detroit.

UNIT NO. S	UNIT NO. D	PUMP METER READINGS BEFORE	PUMP METER READINGS AFTER	GALS. FUEL	QTS. OIL	SPEEDOMETER READING	QTS. ANTI-FREEZE	DRIVER'S SIGNATURE
START →		24604	xxxxxxxxxx	xxxx	xx	xxxxxxxxxx	xxxxxxx	xxxxxxxxxxxxxxxxxxxxxxxxx
352		24604	24642	38	0	20190	2	J. Smith
	366	642	710	68	2	15264	2	B A Brown
291		24914	24960	46	1	64276	2	Fred Green
TOTALS		xxxxxxxxxx	xxxxxxxxxx	356		xxxxxxxxxx	13	xxxxxxxxxxxxxxxxxxxxxxxxx

FOR BRANCH OFFICE USE ONLY

DAILY MOTOR FUEL SUMMARY	GALLONS
On Hand, Start of Shift	208
Received Today	3070
Total	3278
Drawn Today	356
Balance, End of Shift	2922
In tanks, End of Shift	2900
~~Overage~~ or Shortage	-22
Gals. Used this Month to Date	30744
Net ~~Overage~~ or Shortage Gals. this Month to date	-135

PUMP METER READINGS	GALLONS
Meter Reading, End of Shift	24960
Meter Reading, Start of Shift	24604
Difference in Reading	356
Drawn Today	356
Difference	+0

SIGNED E. Dayton BRANCH MANAGER

DAILY OIL SUMMARY	QUARTS
On Hand, Start of Shift	1748
Received Today	416
Total	1664
Drawn Today	13
Balance, End of Shift	1651
In tanks, End of Shift	1645
~~Overage~~ or Shortage	-6
Qts. Used this Month to Date	390
Net ~~Overage~~ or Shortage Qts. this Month to date	-35

FIG. 2. Variation of Fig. 1, used when truck drivers draw out their own fuel

First-Aid Fire Fighting

PART II—The different fire extinguishers and how to use them are explained in this brief installment

THE speed with which an employee uses an extinguisher to attack an incipient fire often makes the difference between an incident and a disaster.

Here are step-by-step directions for operating the different kinds of approved hand extinguishers:

Soda-acid and *foam* extinguishers usually are hung on wall hangers or set on brackets or shelves. Take the hose between the thumb and index finger of the right hand and grasp the ring-top handle. Then with the left hand lift the extinguisher off the hook and lower it, keeping the extinguisher upright. Carry the extinguisher to the fire by means of the ring-top handle held in the right hand, still maintaining a hold on the hose nozzle.

To set the extinguisher in operation, grasp the bottom handle with the left hand and turn the extinguisher upside down. Release the ring top handle, but continue holding the hose in the right hand to direct the stream.

Gas-cartridge and *loaded-stream* extinguishers closely resemble soda-acid and foam types and are operated in much the same way. When these types are inverted, they must be bumped on the ground to rupture the carbon dioxide cartridge that supplies the pressure to expel the stream.

Vaporizing liquid extinguishers of the pump-gun type generally are suspended on wall brackets. Remove the extinguisher by grasping the handle in the right hand and pulling outward. Hold the nozzle end in the left hand with the index and middle finger straddling the nozzle tip. On the way to the fire, twist the handle to unlock it, and if the device is of the air pump type, move the index finger over the nozzle tip and pump up pressure. To expel the stream, move the index finger back and pump steadily and vigorously with the right hand.

Larger sizes—1-, 2- and 3-gal. capacity—sometimes are provided for special use. They are carried to the fire by the handle at the top and operated by hand pump or by stored pressure. To operate the pump type, rest it on the floor, and pump with the left hand while aiming the hose stream with the right. The stored-pressure type is operated by opening the valve on the head casting.

Carbon dioxide extinguishers are carried to the fire with the left hand, by a handle. To operate, rest the extinguisher on the ground, pull out the locking pin, take the horn-like nozzle in the right hand, and turn the valve counter-clockwise with the left.

Pump tank extinguishers are carried to the fire by means of the top handle. The pump is operated by the left hand, while the right hand aims the hose.

Portland, Ore., put on a labor-recruiting campaign in a downtown store window.

17 WAYS TO GET WORKERS

Processors in the Pacific Northwest used many ingenious methods to get local people into the fields and factories during the peak of the season. Other food companies can profit from their experience

By CLAUDIA GAVRILOVA, Puyallup, Wash.

WITHOUT systematically recruiting seasonal labor, it is virtually impossible for freezing and canning plants to meet wartime demands. While some assistance in labor recruiting will come from government agencies, processors cannot depend on that alone to meet their peak labor needs. Canning communities, groups of packers and individual processors must do their own recruiting. How to go about this effectively was learned last year by canners and freezers in the Pacific Northwest. They learned the hard way—by experience.

How Portland Did It

Portland, Ore., put on a program in the corner window of a downtown department store. Speakers explained the vitally important nature of food processing and pointed out the labor shortage. The talks were made at frequent intervals. Members of the armed forces, men and women, stood beside the speakers in the window. Outside the window was a sign-up table with a lady assistant.

During the three-day campaign, September 9, 10 and 11, there was also a loud-speaker truck driving about the city. In addition, several members of the cannery personnel made a house-to-house canvass. There also were radio appeals.

In September people were requested to go to work immediately. But there had been a preparatory program during one week in June. At that time, ladies were asked to prepare for the coming emergency service in food plants. Specific information was given regarding wages and working conditions. Managing personnel of the various canning and freezing firms explained their needs, giving brief stories about their organizations. Members of the military forces were interviewed about the requirements and consumption of foodstuffs.

Before the drive, considerable spinach remained unprocessed due to lack of workers. But in the autumn after the drive, there was no appreciable loss of produce despite a hot-weather period which ripened prunes, peaches, pears and beans virtually at the same time.

The campaign was a group undertaking by five processors in the Portland area, being cooperatively financed by them. It functioned through the U. S. Employment Service, which assisted in carrying on the program and in signing up the workers.

Salem's Systematic Drive

Salem, Ore., also developed a systematic labor drive. An outstanding part of it was an appeal through the churches. Ministers urged people to do their part on the home front. Local

newspapers carried a proclamation to the same effect by the mayor. Furthermore, the city was well covered with window placards, every business house displaying one. These cards showed a map of the city with the location of processing plants, listing below the names and phone numbers. The posters appealed for help. "Phone Now! Help Save Our Food Supply," was part of the appeal.

The recruiting committee also made a reciprocal agreement with the organization handling the Bond sales drive for each of them to advertise the other.

The canners committee represented 11 processing firms which financed the publicity and the hiring of a man to take charge of it.

What Companies Did

In districts where there are few packing plants, recruiting was done individually. California Packing Corp., Vancouver, Wash., made a thorough canvass of the city's housewives early in the spring. From four to six cannery employees went out to talk to the women. And all plant personnel was asked to inform their friends of the need for help, and to turn in names of prospects.

When a shortage developed during the fruit season in September, the firm went on the air with seven local newscasts daily. The announcements lasted about 1½ minutes, telling of the fruit coming in and the urgent need of workers to handle it.

Although the radio appeal brought some response, the most effective means proved to be the personal contact through canvassers.

The Honor Brand Corp. (formerly Santa Cruz Packing Co.), Kent, Wash., acquired most of its workers through personal conversation with prospects. The forelady spent every morning visiting local women. Names of prospects were obtained from various clubs and organizations and from individuals. The company mimeographed three very useful forms for the forelady to leave with each prospective employee. One explained the need, another gave the regulations for employees, and the third established the hours and transportation availability of the prospect. A share-the-ride program was developed, car owners being put on the same shifts as riders in their neighborhood.

Kelley-Farquhar & Co., Tacoma, hired a lady to work on the labor problem as early as February, 1943. She personally contacted possible employees for both the factory and the growers.

R. D. Bodle Co., Seattle, advertised in small district newspapers, stressing the point that workers were needed by a plant right in their district, close to home, without the need to go downtown or to use congested transportation.

Skagit County's Success

Skagit County, in northern Washington, conducted a remarkably successful campaign. The main crop being peas, the greatest labor demand came in July and August. But well-organized planning began in February when food packers approached members of other industries concerned for financial contributions. Slightly under $1,500 was asked and raised, this proving sufficient for the campaign. A committee united all community sources needed to carry on the drive. The executive committee included members of the Extension Service and Employment Service, a superintendent of schools, the manager of the power and light company, managers of two banks, a member of a real estate firm, a cannery executive, two farmers, a member of the U. S. War Board and the manager of the Dairymen's Association. A subcommittee included one member from each club in the county.

Going immediately into action, speakers were arranged for every club meeting. Radio talks contacted the housewives at home.

The various clubs passed out "Food for Victory" questionnaires with red-white-and-blue borders. On these the prospective employee indicated whether he or she would work, or would consider working, in the plant or in the harvest field. Transportation needs were listed. These cards were collected at once.

By June 1, the cards were classified by the full-time paid secretary of the Harvest Campaign. Then as harvest time drew near, three employment offices were opened in Mt. Vernon, Burlington and Cedro Wooley.

All the while, recruiting publicity continued unabated. It began by telling about the progress of the crops. As workers became needed, the committee started almost daily newspaper advertising. For two months, at the peak of the season, the committee was the heaviest advertiser in the local papers, with almost daily stories about the crops. There were full-page ads headed: "Urgent Public Notice; You Are Needed To Save Our Crops." Every ad carried an appeal with a punch, such as: "A little strawberry juice on your hands won't hurt you. . . . You will also find that helping a neighbor in his hour of need will give you a lot of personal satisfaction."

Meanwhile, the secretary telephoned people all day and every day. Those who had promised to work were called and asked. Growers and packing plants communicated their needs to the Harvest Campaign office.

So aggressive was the drive that committee members, at critical times, went along the streets in town asking men to turn out for harvesting.

The campaign worked well enough to gather in all the strawberries, harvest over 10,000 acres of peas, get in the hay, beans, oats and potatoes. Processing plants in that area increased their pea pack by some 30 percent, though not without various difficulties.

Business men and those who had just finished a day of manual labor came to the harvest fields in the evenings. Such viner crews often worked by the light of the moon in the blacked-out coastal region. And the harvesting continued through 13 weeks!

The Harvest Committee attributes its success to these points: (1) Organizing long before there was any emergency. (2) Not asking people to work without first selling them on the idea. (3) Contact by telephone.

Bozeman Canning Co., Mt. Vernon, Wash., estimates that about half of its plant laborers were volunteers. This plant made particularly effective display of posters explaining the vital importance of food processing. It also gave the night shift a half-hour rest period at 10:15, at which time refreshments were served. There also was a musical program, a Mexican guitar player and an accordion orchestra.

Packers in the Puyallup and Sumner vicinity together worked out a labor drive that functioned through the U. S. Employment Service. An employment office was opened in June at Fort Lewis for both plant and field help, and commercial transportation was arranged for volunteer workers. Considerable soldier labor was acquired, the men coming on a voluntary basis.

Additional labor was drawn from the city of Tacoma, particularly school youngsters who were subjected to a preparation campaign before school let out. Valley packers paid 10 cents per employee to provide reduced transportation rates on buses.

Olympia Canning Co. received some aid from civic employees who worked there after office hours.

Two Campaigns in Yakima

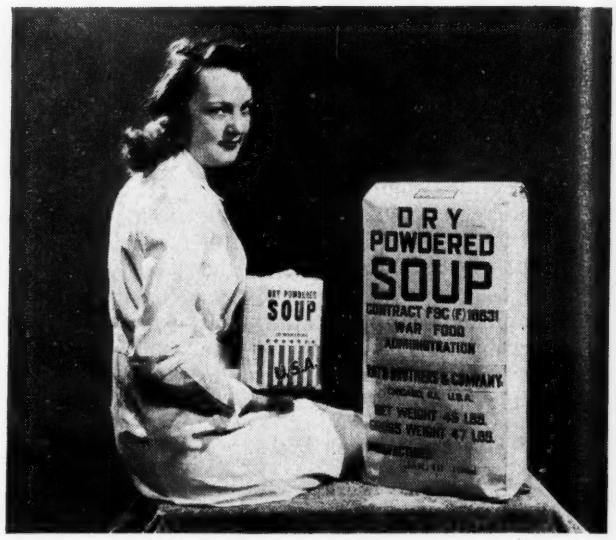
Yakima, in eastern Washington, has a concentration of large plants similar to that at Salem, Ore. Two campaigns were conducted there. One

(*Turn to page 129*)

Flexible Soup Package Solves Export Problem

Dry soup mix is packed in bag-within-bag container for shipment overseas. Dead weight of package materials is reduced by as much as 75 percent. No special equipment is required either for filling or sealing. Commercial materials used

By E. SINGRUEN
Food Technologist, Chicago, Ill.



Nine 5-lb. bags with thermoplastic overwrap are packed in a cotton bag and then put into multiwall paper bag.

MEETING the demand for millions of pounds of emergency foods for overseas shipment has involved a serious problem of packaging in addition to the problems of procurement and processing.

In solving the procurement and processing problems, obtaining energy-producing properties and nutritive values was considered as much as was tonnage. Also, to make certain that these foods would be utilized to their fullest possibilities, they had to be palatable and reach the point of consumption with the maximum retention of characteristic physical properties, eating qualities and nutritive values.

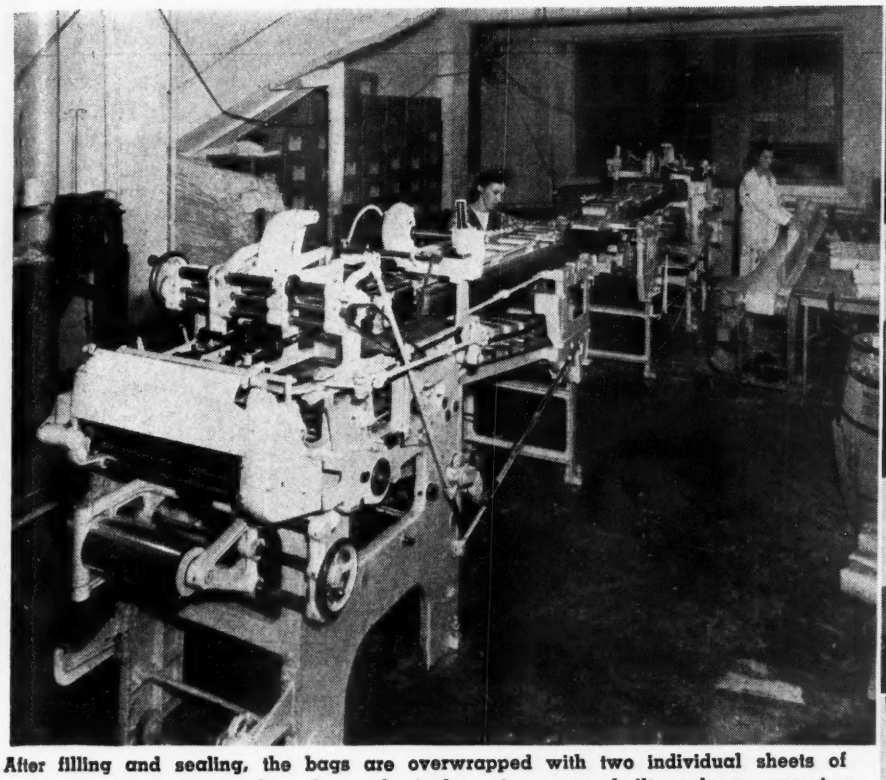
Packaging these foods presented a problem because cramped shipping, inadequate storage and uncertain transportation facilities demand that they be in compact containers and that they be protected against severe weather conditions, rough handling, insect infestation, oxidative deterioration and moisture-vapor transfer.

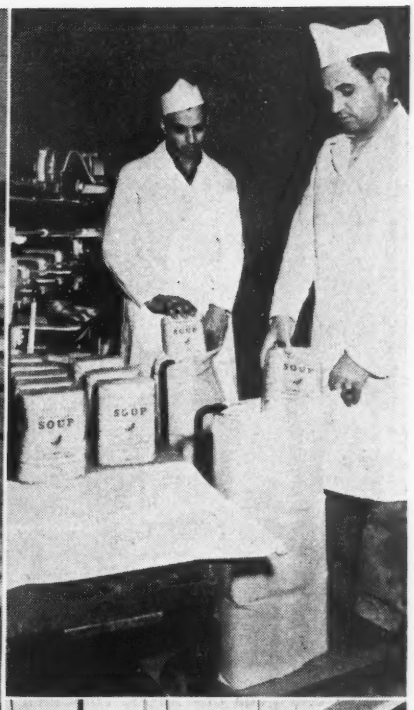
In flour mills and similar dry-flowable food plants, bag-filling lines equipped with no-sift sealers are readily adaptable to the filling of the 5-lb. kraft bags used for soup mixes.

An example of these emergency foods is the dry soup mixes. Regardless of whether intended for use by military, foreign-relief or Lend-Lease agencies, these have proved their value as readily prepared, highly nutritive food. They are suitable for use in combination with other available supplies as a base for stews, purees, and even salads, as well as for consumption in soup form. As prepared to meet specifications, these mixes contain the much needed proteins, vitamins and energy units. Their ingredients are low in cost, must be selected from surplus or abundant foodstuffs, and should be highly suitable for packaging in small units which can be handled easily. Though low in cost, the food value of these mixes requires that they be adequately protected by their containers and that they may be handled, shipped and stored in large quantities.

For a time the puzzling problem was how to package them to withstand the extreme tests of wartime conditions without drawing upon the already too limited supply of strategic packaging materials and without requiring special equipment whose construction materials would involve high priority ratings.

Among the makers of these dry soup mixes who faced this packaging problem is Roth Brothers & Co., Chicago. The interest of this company has been in the creation of markets for new foods and new type containers for well-known foods and beverages. In its activities it has specialized in the utilization of soybean and brewers' yeast for human feeding. One form of





After filling and sealing, the bags are overwrapped with two individual sheets of moisture-resistant, heat-sealing thermoplastic by using custom-built package wrapping machines adjusted for size and weight of bags.

Nine of the 5-lb. bags are packed in a standard cotton bag (picture at top) which is closed by sewing with a standard flour or feed bag closing machine (picture at bottom).

that utilization is its dry soup mixes for emergency feeding.

In the search for a satisfactory container for these soup mixes, one that would meet the wartime conditions, save critical materials and at the same time be suitable for postwar marketing to low-income groups, attention was focused on the flexible, multiwall paper container commonly used in the sugar, flour and chemical industries.

As used first by Roth Brothers & Co., approved by the War Food Administration and subsequently adopted by other soup manufacturers for overseas shipment, the flexible combination bag assembly identified as the "Sak-Pak," was worked out by Sydney M. Roth. The assembly consists of nine 5-lb. bag units, with a double overwrap of thermoplastic sheets for individual protection, compactly arranged in a cotton bag and further contained in a 5-ply multiwall kraft bag closed with a moisture-vapor-resistant seal.

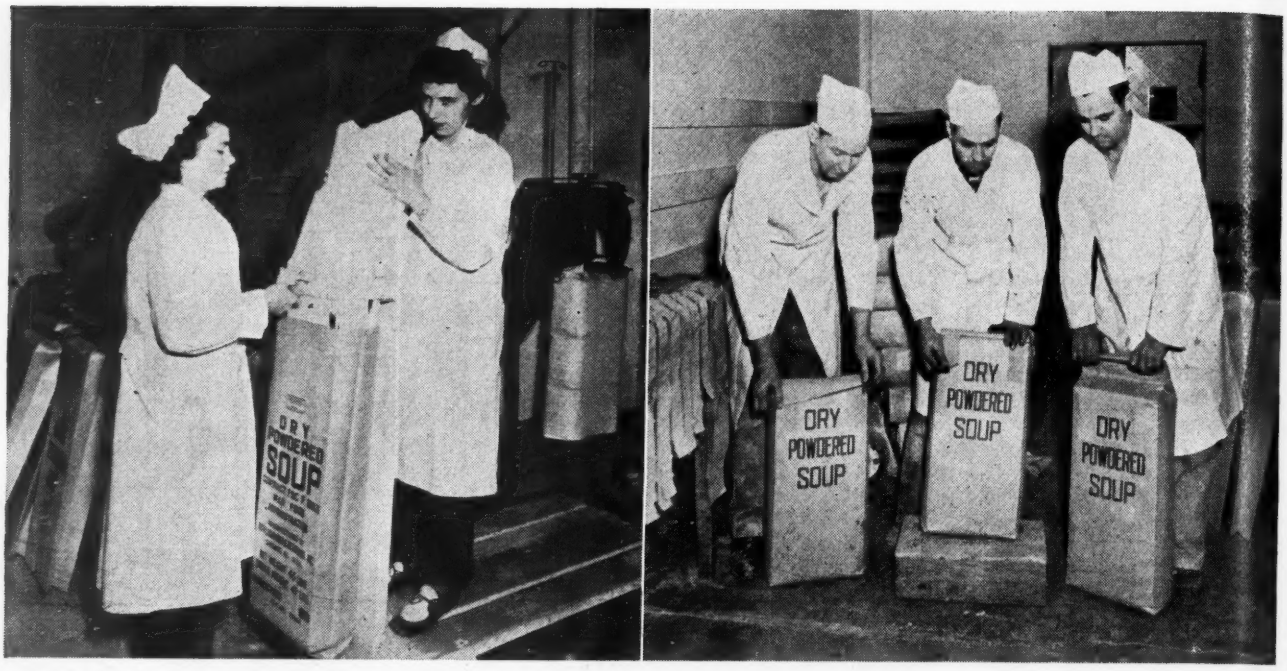
The 5-lb. unit consists of a high-strength, single-ply, kraft bag with an odor-free adhesive delta seal as commonly used for 25-lb. bags of flour. While the kraft may be bleached or unbleached, the bleached grade is preferred to give contrast to the red and blue color combination of printing inks. Each bag carries an identifying design using stars, stripes, and insignia on the wide panels which unmistakably identify the U. S. A. as the country of origin. Directions for preparation are printed in English and in 14 foreign languages on the narrow panels.

Moisture resistance is obtained by double wrapping each bag with moisture-resisting thermoplastic sheets in such a manner that the heat-seal of one wrapper is along the front panel and the heat-seal of the second wrapper is along the back panel. This double overwrap not only resists transfer of moisture vapor but supplies additional protection against sifting and against insect infestation.

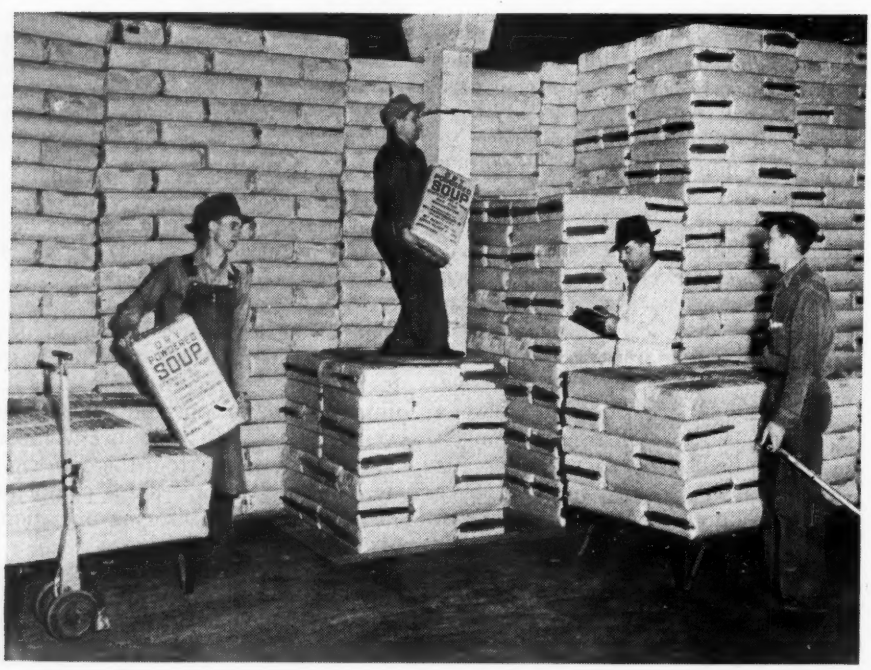
This assembly is a happy choice because it does not require any specially built packing, sealing and wrapping equipment.

The Roth soup mixes are packaged in a flour mill having a packaging line that is used intermittently for 5-lb. bags of family, self-rising and pancake flours. Filling is done on two gravimetric auger packers connected by belt conveyors with a vibrating shaker, an automatic delta-sealing machine, a coding or dating unit and a tunnel heater to assure drying of the adhesive. After manual inspection to assure a satisfactory delta-seal, overwrapping is accomplished by two package wrapping machines. They are connected by a short, inclined wooden roller conveyor on which the bags are turned over before going to the second wrapping machine. The individual thermoplastic wrappers are applied at the rate of 30 to 35 bags per minute. Only minor changes in the construction of the custom-built machines were necessary to compensate for the difference in unit size, proportions and the package weight. Except that the overwrapped packages are taken from the conveyors by hand and inspected for completeness of seal, the packaging operations are automatic.

The final step in this flexible packaging is the assembly of nine overwrapped 5-lb. bags in a standard cotton bag which, in turn, is contained in



Nine 5-lb bags are further contained in a 5-ply kraft bag closed with a triple fold and tape sealed or sewed and wax dipped.



a 5-ply, asphalt-laminated, multiwall paper bag. This multiwall paper bag has a water-repelling outer ply, is closed with a triple fold and sealed with cloth-backed, water-proofed, pressure sealing tape or is sewed and wax-dipped. A variety of combinations and types of packaging materials is possible in this assembly.

All elements of the assembly are made from commercially used materials and are adaptable in size and shape to existing bag filling and sealing machines. Multiwall paper bags of similar specifications have proved their usefulness for bulk overseas shipment of various dry or granular foods and chemicals.

In addition to its suitability for use on packaging lines in flour, cereal or sugar plants, for stacking to save transport and storage space, and for handling by women stevedores working on the European docks, the "Sak-Pak" permits noteworthy savings in packaging materials. The total gross weight of an assembly containing 45 lb. of dry soup is only 47 lb. This weight represents a reduction of as much as 75 percent in the dead weight of packaging materials when compared with rigid container packaging of dry soup mixes for overseas use.

A decrease of as much as 20 percent in shipping volume and storage space requirements is also reported for the flexible-pack assembly.

Flexible package assembly permits compact nonshift loading of railroad cars (above) and high stacking in warehouses (below).

Can Coating Program Now Under Way

Army wants exterior coating on canned foods destined for overseas shipment, for camouflage and rust-inhibiting purposes. Over 40 million cases involved

PRO-COATING—the process of camouflaging bright tin cans and protecting them from rust—has been developed by the Army into a program of some magnitude. The Army wants all cans destined for theaters of war to have exterior coatings. This means that some 40 million cases of canned fruits and vegetables will be pro-coated, according to early estimates. In addition, canned fish, canned milk and other canned foods will have to be coated.

The pro-coating program will be supervised by the U. S. Army Quartermaster offices in Jersey City, N. J., Chicago, Ill., and Oakland, Calif., aided by a civilian consultant, drawn from the canning industry, in each office. Each of these offices will designate in their respective areas the canners that will become authorized pro-coaters. Present indications are that about 100 canners in the Jersey City region, as many, or more, in the Chicago area and 36 to 40 in the Oakland territory will be included in the program. Canned foods purchased by the Army from canners not authorized as pro-coaters will be used domestically or shipped to areas where pro-coated cans are not deemed a necessity.

The designated pro-coaters will receive "letter of purchase" orders which will authorize them to buy pro-coating equipment. These orders will permit the canner to build his own pro-coating machine and also make what alterations might be necessary in the installation of a machine. All purchases, installation costs and alterations must first have the approval of the QMC.

The contract issued to the canner by the QMC contains a "recapture" clause specifying that all equipment and materials are the property of the government and may be repossessed as soon as pro-coating is no longer deemed necessary.

Where the canner himself finances the pro-coating equipment, he will write off the cost by an extra charge of so much per case. In that event of course, he will own the equipment.

Costs of operation have not, as yet, been established by the canners now operating pro-coating departments. So at the outset, the QMC will allow the canner to estimate his costs, on a forward-pricing basis. After a reasonable period of operation, the canner will present his cost records to the QMC and, based on a comparison with similar operations, the figures either will be approved or modified.

The pro-coating machine, being a new unit added to canning lines, must be built to order. Due to the element of time involved in the manufacture of the machines, it is indicated that the coating of canned salmon and pineapple will be handled, temporarily, at pro-coating stations. Although several stations will handle salmon, the only one announced so far is the one at Bellingham, Wash. Canned pineapple will be pro-coated in San Francisco under the direction of the Pineapple Grower's Association of Hawaii. As soon as machines are available, they will be shipped to the Hawaiian Islands.

Specifications for pro-coating are outlined in QMC bulletin C.Q.D. No. 200-A, dated October 22, 1943, and headed, "Coatings; Exterior, Air-Drying, Camouflage and Rust-Inhibiting for Food Cans."

The government has issued a list of 20 approved pro-coat paint manufacturers from which canners may purchase their coating materials. A few canners now operating pro-coating machines are using a glyceral-phthalate type of coating thinned with a suitable reducer. Equal parts of each are used, at present.

Since pro-coating makes embossed lettering on can tops illegible, QMC specifications will include instructions for printing the name of the product on the can by marking machines or hand stamping.

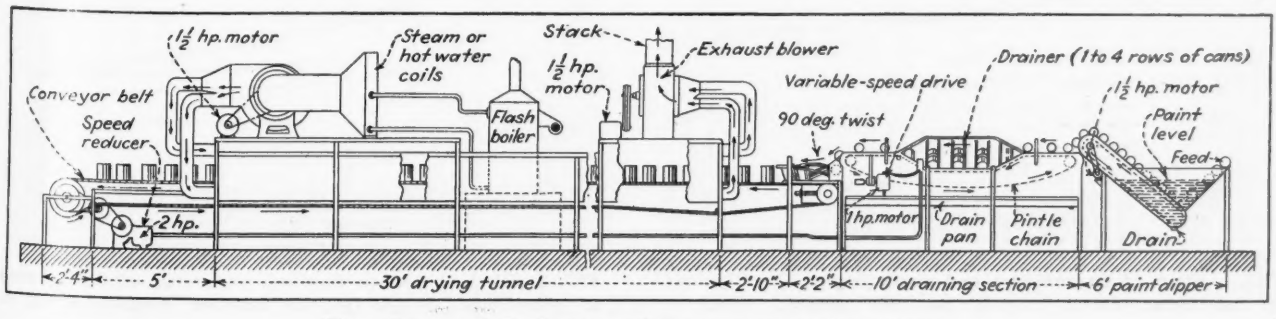
The dip method of coating seems the most efficient and economical, and it meets all QMC specifications for pro-coating. With spray applications, the loss of material ranged as high as 40 percent, as none of it was recovered. Drying of cans coated with the glyceral-phthalate type of coating seems most efficient in tunnels, where air at 130 to 150 deg. flows over cans counter to the direction of conveyor travel.

One of the first pro-coating machines designed and put into operation in the West is that built by Benner & Nawman Co., Oakland, Calif. It costs approximately $4,500.

Cans are fed directly into a V-shaped coating tank on a conveyor. At the bottom of the tank, the cans are picked up by an elevator and conveyed to a drainer. After draining off the superfluous paint, the cans are given a 90-deg. twist and enter the drying tunnel upright upon a wire-mesh conveyor. Air-flow in the tunnel is provided by a blower and a suction fan. Steam or hot water coils heat the air to 130 to 150 deg. F.

The capacity of the machine is reported to be 600 cases of No. 10 cans per hour, or about 750 cases of No. 2½ cans per hour. It requires approximately 3 minutes for cans to go through the processes.

The manufacture of this machine is developing a smaller one which will be sold for about $1,000, or less.



Flow diagram of the Benner and Nawman pro-coating process.

New Facts About Packaging And Storing Dehydrated Food

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago, Ill.

Here are the results of recent research on the technical factors which affect the packaging and storage of a dehydrated food. This report is one of a series by Continental Can Co. on various dehydrated products

PART IV—DEHYDRATED CARROTS

THESE conclusions are drawn from the results of the examinations during one year's storage:

1. If properly prepared, dehydrated carrots can be reconstituted to make an attractive food. The final cooked product is comparable to cooked carrots prepared from whole carrots as ordinarily purchased.

They are an excellent source of carotene (pro-vitamin A) and a good source of both thiamine (vitamin B_1) and riboflavin (vitamin B_2).

2. The original flavor, odor, color and carotene content of dehydrated carrots can be preserved with little change for a period of at least 6 months and possibly one year, providing the product is held in an atmosphere comparatively free from oxygen and is not subjected to temperatures above 80 deg. F. The riboflavin content is quite stable regardless of temperature or packaging, while the thiamine content remains at about the original level only at ordinary room temperatures.

3. Dehydrated carrots are very sensitive to high storage temperatures. Their overall quality is quickly reduced by temperatures as low as 98 deg. F. When stored at 130 deg. F., they become inedible in one month.

The dehydrated carrots for this experimental pack were secured from the Rochester, N. Y., plant of the Beech-Nut Packing Co. A portion of the November 4th commercial run of this material was set aside, taken to the New York State Agricultural Experiment Station at Geneva and packed in cans under various conditions. The carrots were of the Red Core Chantenay variety and were grown chiefly on muck land in the vicinity of Rochester, N. Y. They were fully mature and were dried as fast as they arrived from the field.

The carrots were cut into $\frac{3}{8}$-in. cubes, steam-blanched in a retort under pressure for $6\frac{1}{2}$ minutes at 240 deg. F. and then dehydrated in a center-exhaust tunnel of the Eidt design. They were in the drying tunnel for 5 hours and, in that time, were dried to a moisture content of approximately 8 percent. Dehydration was completed in a finishing bin where this particu-

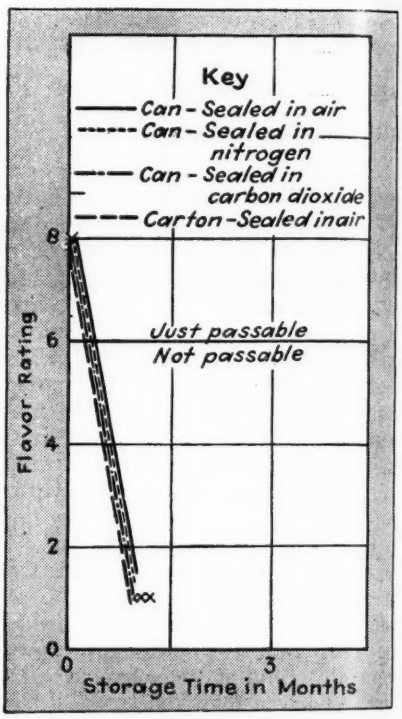


FIG. 3. Effect of storage time and packaging on flavor rating of dehydrated carrots (regular moisture content), stored at 130 deg. F.

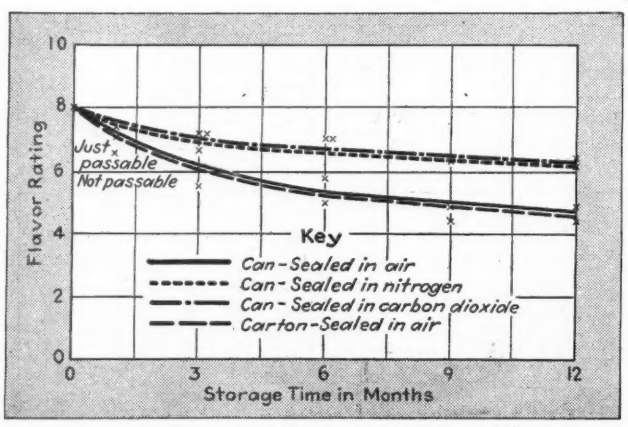


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated carrots (regular moisture content), stored at 75-80 deg. F.

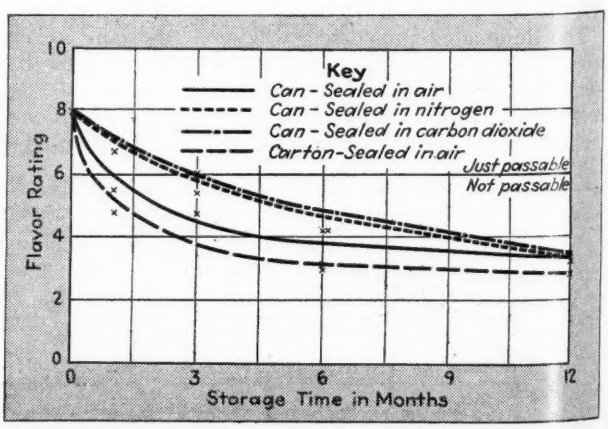


FIG. 2. Effect of storage time and packaging on flavor rating of dehydrated carrots (regular moisture content), stored at 98 deg. F.

TABLE IA—Results of Examinations of Dehydrated Carrots.

Storage at 75–80° F.—(room temperature)

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Flavor rating		Drained weight (grams)		Color (dry product) % N-1 (black)		% 4R 4/16 (bright red)		% 5R 4/14 (red)		% 5 YR 6/12 (orange)	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	8.0	8.2	..	..	..	..	..	.	..	..	..	..
	Can—N_2	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Can—CO_2	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Carton	8.0	8.2	..	..	..	..	..	..	..	..	..	..
1 month	Can—air	7.1	7.5	48	47	57	58	..	..	23	20	20	22
	Can—N_2	7.3	7.5	49	50	59	60	..	..	19	18	22	22
	Can—CO_2	7.3	7.5	51	49	61	63	..	..	19	18	20	19
	Carton	6.6	7.5	50	48	62	63	..	.	19	18	19	19
3 months	Can—air	6.7	6.0	46	50	..	62	..	..	..	14	..	24
	Can—N_2	7.2	7.7	47	48	..	65	..	..	..	21	..	14
	Can—CO_2	7.2	7.8	47	45	..	..	..	..	..	..	..	..
	Carton	5.5	6.0	..	50	..	60	..	..	..	15	..	25
6 months	Can—air	5.0	5.4	50	41	59	60	15	19	..	..	26	21
	Can—N_2	7.1	6.9	47	41	56	59	20	19	..	..	24	22
	Can—CO_2	7.1	6.9	43	41	56	59	20	19	..	..	24	22
	Carton	5.8	5.2	42	41	60	62	14	17	..	..	26	21
9 months	Can—air	4.5	5.3	50	47	54	57	17	17	..	..	29	26
	Can—N_2	6.3	6.1	49	47	53	56	21	21	..	..	26	23
	Can—CO_2	6.2	6.1	47	47	50	56	24	21	..	..	26	23
	Carton	4.9	5.1	46	47	62	61	15	9	..	..	23	30
12 months	Can—air	4.9	5.0	40	41	..	..	..	..	..	..	..	..
	Can—N_2	6.1	6.3	41	42	..	..	..	..	..	..	..	..
	Can—CO_2	6.4	6.2	41	42	..	..	..	..	..	..	..	..
	Carton	4.4	5.0	41	41	..	..	..	..	..	..	..	..

Odor tests made at the end of 1–6–and 12-month storage periods indicated a definite difference between the gas-packed samples and those sealed in air. The air-packed samples were described as having a "straw" or "hay-like" odor, while the gas-packed samples had a more typical carrot odor. There was no evident difference between the carrots of the two moisture contents nor between the CO_2 and nitrogen-packed samples.

TABLE IB—Results of Examinations of Dehydrated Carrots.

Storage at 75–80° F.—(room temperature)

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Vitamin content (mg./100 gm.) Carotene		Thiamine		Riboflavin		Gas analyses % O_2		% CO_2		pH	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	69	..	0.303	0.303	0.300	0.339	....	....	....	....	...	...
	Can—N_2	77	..	0.302	0.299	0.322	0.349	0.4	0.1	2.6	3.1	...	...
	Can—CO_2	77	..	0.269	0.300	0.356	0.314	0.0	0.2	99.0	97.0	...	...
	Carton	69	..	0.310	0.309	0.326	0.305	....	....	....	....	...	...
1 month	Can—air	..	..	0.328	0.186	0.341	0.313	....	....	....	...	5.3	5.2
	Can—N_2	..	..	0.370	0.196	.....	.....	....	....	....	....	5.3	5.2
	Can—CO_2	..	..	0.295	0.194	0.369	0.334	....	....	....	....	5.3	5.2
	Carton	..	..	0.280	0.204	0.359	0.334	...	....	....	....	5.3	...
3 months	Can—air	38	..	0.232	0.225	0.386	0.391	....	....	....	....	5.3	5.4
	Can—N_2	70	..	0.274	0.242	0.396	0.388	....	....	....	....	5.3	5.3
	Can—CO_2	67	..	0.238	0.225	0.376	0.390	....	...	....	....	5.3	5.3
	Carton	37	..	0.274	0.235	0.402	0.392	....	....	....	....	5.3	5.3
6 months	Can—air	44	39	0.244	0.244	0.353	0.378	11.3	10.3	6.9	8.3	5.2	5.2
	Can—N_2	71	72	0.249	.....	0.369	0.395	0.2	0.2	4.7	5.6	5.2	5.2
	Can—CO_2	59	67	0.240	0.236	0.350	0.390	0.5	0.3	95.7	99.0	5.2	5.2
	Carton	55	33	0.244	0.239	0.354	0.390	....	....	....	....	5.2	5.2
9 months	Can—air	..	27	0.243	0.271	.....	.....	8.0	6.8	10.0	10.6	5.2	5.2
	Can—N_2	..	65	0.246	0.242	.....	.....	0.6	0.2	6.7	7.3	5.2	5.2
	Can—CO_2	..	62	0.251	0.197	.....	.....	0.2	0.4	97.3	98.2	5.2	5.2
	Carton	..	22	0.270	0.292	.....	.....	....	....	....	....	5.2	5.2
12 months	Can—air	48	31	0.199	0.268	0.298	0.359	7.5	7.0	11.1	10.7	...	...
	Can—N_2	72	55	0.195	0.256	0.310	0.307	0.0	0.1	7.2	0.5	...	...
	Can—CO_2	76	58	0.251	0.270	.....	0.309	0.6	0.5	96.6	98.5	...	..
	Carton	51	34	0.258	0.252	0.307	0.355	....	....	....	....	...	...

TABLE IIA—Results of Examinations of Dehydrated Carrots.

Storage at 98° F.

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Flavor rating		Drained weight (grams)		Color (dry product) % N-1 (black)		% 4R 4/16 (bright red)		% 5R 4/14 (red)		% 5 YR 6/12 (orange)	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	8.0	8.2	..	..	..	..	..	..	..	..	.	..
	Can—N_2	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Can—CO_2	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Carton	8.0	8.2	..	..	..	..	..	..	..	..	..	..
1 month	Can—air	5.5	6.8	48	51	64	66	..	..	19	16	17	18
	Can—N_2	6.7	6.9	48	46	64	59	..	..	17	19	19	22
	Can—CO_2	7.1	6.9	49	50	61	62	..	..	17	18	22	20
	Carton	4.8	6.9	48	50	64	62	..	..	15	18	21	20
3 months	Can—air	5.4	5.2	39	47	72	71	..	..	13	10	15	19
	Can—N_2	6.0	7.0	41	51	70	70	..	..	15	16	15	14
	Can—CO_2	5.9	6.8	39	45	72	66	..	..	13	18	15	16
	Carton	4.8	5.3	40	45	72	70	..	..	13	6	15	24
6 months	Can—air	3.2	3.8	41	42	79	80	1	5	6	..	14	15
	Can—N_2	4.2	5.0	41	43	76	74	9	10	1	..	14	16
	Can—CO_2	4.2	4.7	41	41	76	80	9	8	1	..	14	12
	Carton	3.1	3.8	41	38	82	80	4	7	..	..	14	13
9 months	Can—air	Not rated		..	..	85	77	4	9	..	..	11	14
	Can—N_2	Not rated		..	..	77	74	11	11	..	..	12	15
	Can—CO_2	Not rated		..	..	76	74	10	10	..	..	14	16
	Carton	Not rated		..	..	86	83	3	3	..	..	11	14
12 months	Can—air	3.5	2.6	36	37	..	..	..	..	..	..	..	..
	Can—N_2	3.4	3.2	35	39	..	..	..	..	..	..	..	..
	Can—CO_2	3.6	3.1	35	39	..	..	..	..	..	..	..	..
	Carton	2.9	3.0	34	39	..	..	..	..	..	..	..	..

As in the case of the samples stored at 75–80 deg. F, there was a definite difference in odor between the air-packed and gas-packed samples. The former had a "straw" or "hay-like" off odor. However, this difference was marked somewhat at later examinations because of a "scorched" or "caramel" odor also found to be present.

lar lot of carrots remained 18 hours at a temperature of approximately 130 deg. F. to bring them to the 5 percent moisture content allowed by the Army specifications. After removal from the finishing bins, they were hermetically sealed in air in 5-gal. square cans and immediately taken to Geneva where the experimental pack was made on November 6.

The staff of the New York State Agricultural Experiment Station assisted in making the experimental pack. One-half of the total amount of carrots received from the Beech-Nut Packing Co. was placed in an experimental dehydrater at the Experiment Station and subjected to a temperature of 135 deg. F. in flowing air having a very low relative humidity (approximately 8 percent) for another 6 hours. This was done in an attempt to reduce the moisture content appreciably below the 5 percent level. The experiment was not too successful, however, in that the moisture content of the carrots was reduced only an additional 1 percent. The lots of carrots at the two moisture levels were then packaged separately. Only 211x414 cans were packed at Geneva, but a sufficient number of those hermetically sealed in air were included so that samples of the new Army 3-in-1 containers could be packed from them at the Chicago laboratories.

The following modifications of the regular examination procedures were made in the course of this experiment:

TABLE IIB—Results of Examinations of Dehydrated Carrots.

Storage at 98° F.

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Carotene		Vitamin content (mg./100 gm.) Thiamine		Riboflavin		Gas Analyses % O_2		% CO_2		pH	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	69	..	0.303	0.303	0.300	0.339	....	....	....	....	...	...
	Can—N_2	77	..	0.302	0.299	0.322	0.349	0.4	0.1	2.6	3.1	...	...
	Can—CO_2	77	..	0.269	0.300	0.356	0.314	0.0	0.2	99.0	97.0	...	...
	Carton	69	..	0.310	0.309	0.326	0.305	....	....	....	....	..	...
1 month	Can—air	57	59	0.280	0.291	0.336	0.365	....	....	....	....	...	5.2
	Can—N_2	80	78	0.294	0.222	0.310	.....	....	....	....	....	...	5.2
	Can—CO_2	75	75	0.204	0.255	0.336	.....	....	....	....	....	...	5.2
	Carton	54	62	0.289	0.261	0.329	0.360	....	....	....	....	...	5.2
3 months	Can—air	43	40	0.221	0.163	0.367	0.391	10.2	10.5	15.2	15.1	5.1	5.0
	Can—N_2	78	57	0.240	0.221	0.380	0.365	0.2	0.1	11.0	12.3	5.1	5.1
	Can—CO_2	70	51	0.208	0.187	0.378	0.390	0.2	0.0	99.3	97.4	5.1	5.1
	Carton	45	28	0.190	0.177	0.367	0.387	....	....	..	....	5.2	5.1
6 months	Can—air	45	36	0.169	0.173	0.320	0.348	5.6	6.3	22.9	.3	4.9	4.9
	Can—N_2	71	56	0.142	0.213	0.344	0.380	0.1	0.2	20.2	17.5	4.8	4.9
	Can—CO_2	64	61	.....	0.192	0.326	0.363	0.1	0.2	98.7	99.0	4.8	4.9
	Carton	45	37	0.195	0.226	0.330	0.353	....	....	....	....	4.9	4.9
9 months	Can—air	35	..	0.180	0.222	.....	.....	2.9	3.5	28.8	27.4	...	...
	Can—N_2	..	..	0.136	0.196	.....	.....	0.0	0.0	21.1	23.1	...	...
	Can—CO_2	..	..	.....	0.213	.....	.....	0.3	0.2	98.3	98.3	...	...
	Carton	44	..	0.139	0.228	.....	.....	....	....	....	....	...	...
12 months	Can—air	33	46	0.174	0.185	0.314	0.321	....	1.6	....	32.7	...	...
	Can—N_2	44	79	0.202	0.209	0.336	0.309	...s	0.0	....	7.5	...	...
	Can—CO_2	63	65	0.198	0.185	0.300	0.311	....	0.1	....	99.1	...	...
	Carton	37	52	0.197	0.196	0.317	0.308	....	....	....	....	...	...

TABLE IIIA—Results of Examinations of Dehydrated Carrots.

Storage at 130° F.

A—Regular moisture conten 5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Flavor rating		Drained weight (grams)		% N-1 (black)		Color dry (product) % 4R 4/16 (bright red)		% 5R 4/14 (red)		% 5 YR 6/12 (orange)	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Can—N_2	8.0	8.2	..	..	..	..	..	..	..	.	0	..
	Can—CO_2	8.0	8.2	..	..	..	..	..	..	..	..	..	..
	Carton	8.0	8.2	..	..	..	..	..	..	..	..	..	..
1 month	Can—air	Inedible		37	42	92	94	..	..	1	1	7	5
	Can—N_2	Inedible		37	41	92	91	..	..	2	3	6	6
	Can—CO_2	Inedible		36	42	85	91	..	..	3	3	12	6
	Carton	Inedible		36	40	93	93	..	..	2	3	5	4
2 months	Can—air	Inedible		..	..	96	96	2	1	..	..	2	3
	Can—N_2	Inedible		..	..	96	94	2	1	..	..	2	5
	Can—CO_2	Inedible		..	..	95	94	2	1	..	..	3	5
	Carton	Inedible		..	..	97	96	1	..	..	..	2	4
3 months	Can—air	Inedible		27	..	97	..	..	..	1	..	2	..
	Can—N_2	Inedible		29	..	96	..	..	..	1	..	3	..
	Can—CO_2	Inedible		30	..	96	..	..	..	1	..	3	..
	Carton	Inedible		31	..	97	..	..	..	1	..	2	..

TABLE IIIB—Results of Examinations of Dehydrated Carrots.

Storage at 130° F

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Peroxidase activity—both A and B negative

Storage time	Package	Carotene		Vitamin content (mg./100 gm.) Thiamine		Riboflavin		Gas analyses % O_2		% CO_2		pH	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	69	..	0.303	0.303	0.300	0.339	...	...	....	....	...	...
	Can—N_2	77	..	0.302	0.299	0.322	0.349	0.4	0.1	2.6	3.1	...	...
	Can—CO_2	77	..	0.269	0.300	0.356	0.314	0.0	0.2	99.0	97.0	...	...
	Carton	69	..	0.310	0.309	0.326	0.305	...	...	....	....	...	...
1 month	Can—air	50	60	0.156	0.140	0.318	0.327	3.4	...	38.7	....	...	4.5
	Can—N_2	60	88	0.158	0.128	0.334	.....	0.0	0.1	38.8	36.5	...	4.5
	Can—CO_2	67	..	0.174	0.120	0.328	0.340	0.3	0.3	99.2	99.4	...	4.6
	Carton	50	52	0.165	0.149	0.350	.....	...	...	....	....	...	4.6
2 months	Can—air	..	..	0.070	0.107	0.405	0.394	0.2	0.5	59.9	60.6	...	...
	Can—N_2	..	..	0.081	0.110	0.421	0.374	0.7	0.3	57.1	45.2	...	...
	Can—CO_2	..	..	0.076	0.112	0.387	0.407	0.2	0.2	97.0	98.8	...	...
	Carton	..	.	0.092	0.109	0.374	0.363	...	...	....	....	...	...
3 months	Can—air	32	27	.....	.....	.....	.....	...	...	....	....	4.2	...
	Can—N_2	40	34	.....	.....	.....	.....	...	...	....	....	4.2	...
	Can—CO_2	47	33	.....	.....	.....	.....	...	...	....	....	4.2	...
	Carton	17	21	.....	.....	.....	.....	...	...	....	....	4.3	...

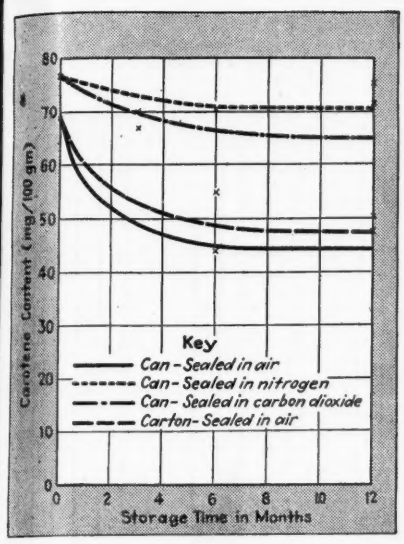


FIG. 4. Effect of storage time and packaging on carotene content of dehydrated carrots (regular moisture content) stored at 75-80 deg. F.

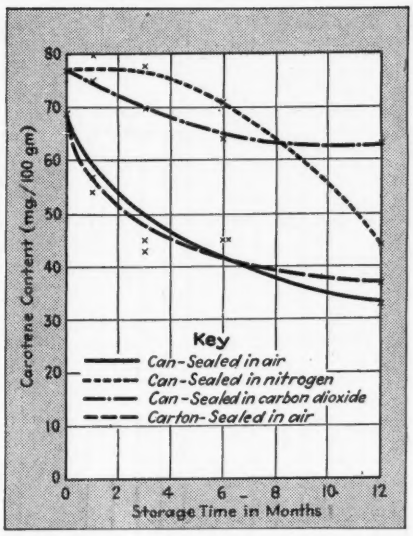


FIG. 5. Effect of storage time and packaging on carotene content of dehydrated carrots (regular moisture content), stored at 98 deg. F.

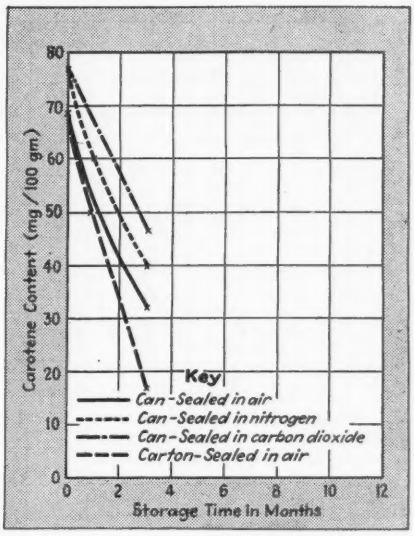


FIG. 6. Effect of storage time and packaging on carotene content of dehydrated carrots (regular moisture content), stored at 130 deg. F.

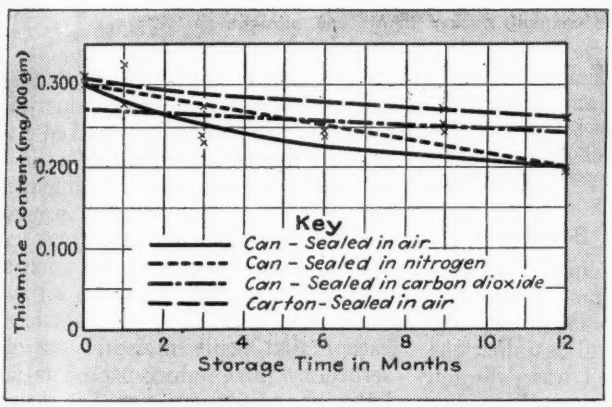

Thiamine Content (mg/100 gm)
Storage Time in Months
Key
Can - Sealed in air
Can - Sealed in nitrogen
Can - Sealed in carbon dioxide
Carton-Sealed in air

FIG. 7. Effect of storage time and packaging on the thiamine content of dehydrated carrots (regular moisture content), stored at 75-80 deg. F.

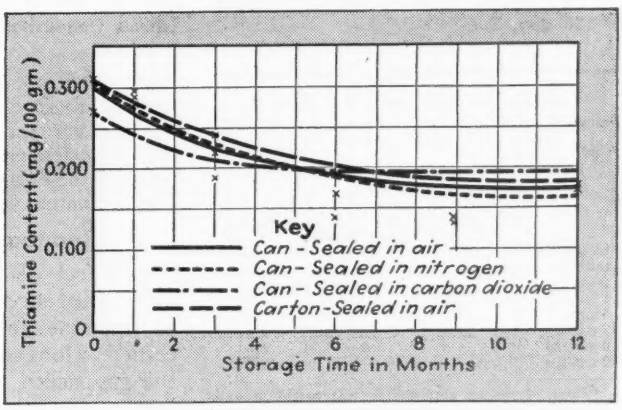


FIG. 8. Effect of storage time and packaging on the thiamine content of dehydrated carrots (regular moisture content), stored at 98 deg. F.

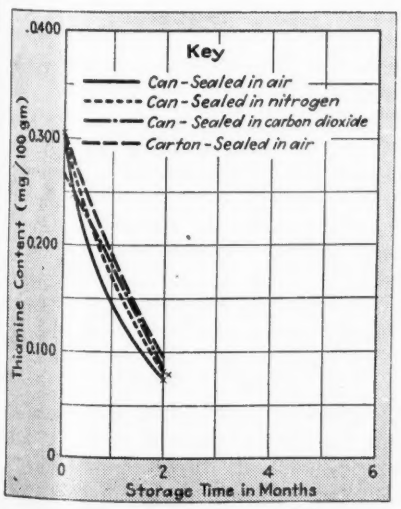


FIG. 9. Effect of storage time and packaging on the thiamine content of dehydrated carrots (regular moisture content), stored at 130 deg. F.

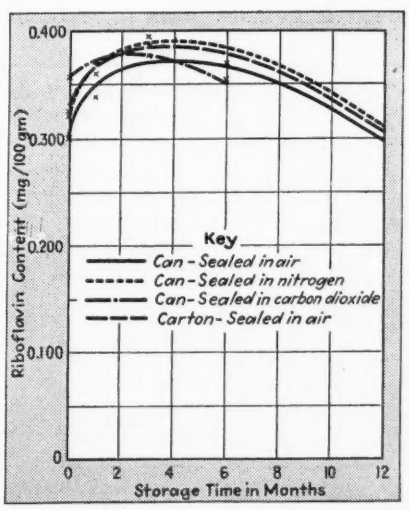


FIG. 10. Effect of storage time and packaging on the riboflavin content of dehydrated carrots (regular moisture content), stored at 75-80 deg. F.

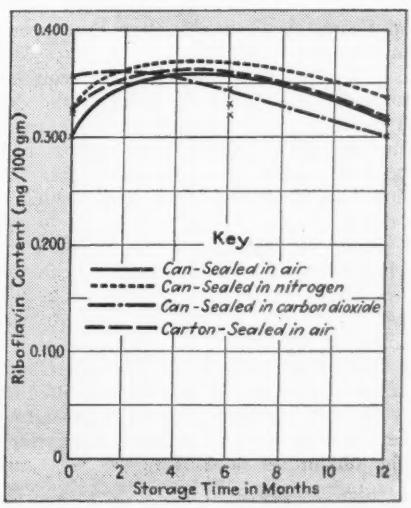


FIG. 11. Effect of storage time and packaging on the riboflavin content of dehydrated carrots (regular moisture content), stored at 98 deg. F.

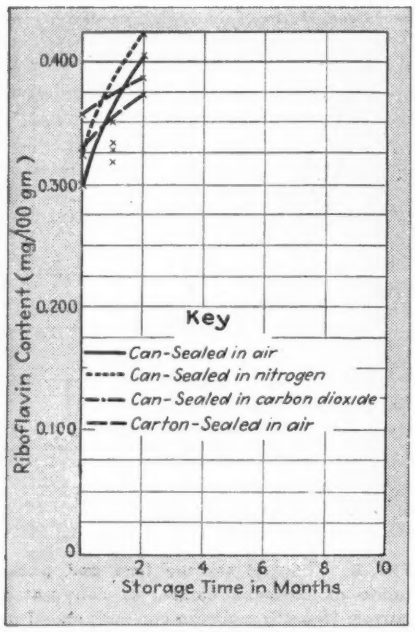


FIG. 12. Effect of storage time and packaging on riboflavin content of dehydrated carrots (regular moisture content), stored at 130 deg. F.

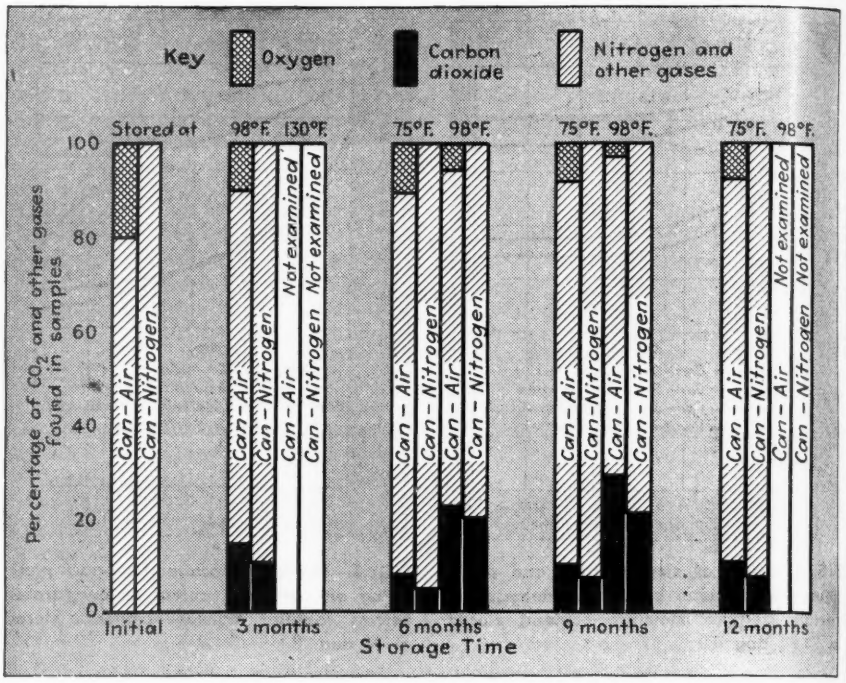


FIG. 13. Effect of storage time and temperature on evolution of CO_2 by dehydrated carrots (regular moisture content), packed in air and nitrogen.

TABLE IV—Dehydrated Carrots.
Results of periodic weighings of product packed in cartons stored at 98°F. and 93% relative humidity

A—Regular moisture content—5.6%
B—Lower moisture content—4.6%

Storage time	Number of samples weighed A	Number of samples weighed B	Average percenti n-crease in product weight over original* A	Average percenti n-crease in product weight over original* B
Initial examination	16	16	....	....
1 month	16	16	0	0
3 months	14	15	0.31	0.31
6 months	12	14	0.61	0.62
9 months	11	12	1.30	1.32
12 months	7	8	1.94	1.72

*These figures are corrected for the weight of water absorbed by the paper in the container (4% increase in container weight in 5 days).

1. Because of some delay in receiving the bags and in making arrangements for the initial examination of the product, the packages were not placed in storage nor the initial examination completed until approximately 3 weeks after the experimental pack was made.

2. Color: The Munsell disks required to match adequately the color of the dehydrated carrots were not on hand until one month of the storage period had been completed. Consequently, data are not available on the color of the original samples.

3. Reconstitution: All the flavor tests, pH readings of cooking liquor and drained weights were made on cooked carrots prepared from the samples according to the following formula:

Ten grams of dehydrated carrots is added to 100 c.c. of water. This mixture is allowed to stand at room temperature for 20 minutes. After this soaking time, the mixture is slowly brought to a boil, (requires about 15 minutes), and simmered for 30 min.) pH readings were made on the resulting cooking liquor with the aid of a glass electrode. No drained weight data were taken at the initial examination because the possibilities of change in them was not recognized until after the packages had been stored.

4. Because the product stored at 130 deg. F. deteriorated so rapidly, examinations of these samples were discontinued after 3 months.

Summary of Results

1. Effect of Packaging—Packaging had little effect as far as retention of thiamine and riboflavin was concerned. However, in all examinations, the gas-packed product was definitely better than the air packed product with respect to flavor, odor and carotene content. Those samples not gas-packed soon developed a "hay-like" odor as wall as an "off" flavor and showed a considerable loss in a carotene. It was also evident, especially after 6- and 9-month storage, that the original red color of the product was retained better in the gas-packed cans than in the packages sealed in air.

There was no appreciable difference between the samples packed in nitrogen and in CO_2. Similarly, there was little difference between the samples packed in the cans sealed in air and those packed in the paper containers, except that some moisture was absorbed by the product packed in the latter when they were stored at 98 deg. F. and 93 percent relative humidity.

2. Effect of Storage Time and Temperature—Storage at 130 deg. F. very quickly lowered the overall quality of the product. In less than one month

(*Turn to page 137*)

TABLE V—Dehydrated Carrots.
Results of periodic moisture determinations of product

A—Regular moisture content
B—Lower moisture content

Storage time	Storage temperature	Package	Moisture content (percent of total weight) A	Moisture content (percent of total weight) B
Initial	.....	.....	5.6	4.6
1 month	98°F.*	Carton	5.5	5.5
3 months	98°F.*	Carton	6.0	...
6 months	98°F.	Can—air	6.9	5.1
	98°F.	Can—N_2	6.4	5.2
	98°F.*	Carton	7.0	5.8
6 months	75–80°F.	Can—air	5.6	4.9
	75–80°F.	Can—N_2	6.2	4.7
	75–80°F.	Carton	5.7	4.8
9 months	98°F.	Can—air	6.3	5.3
	98°F.	Can—N_2	6.8	5.6
	98°F.*	Carton	6.6	6.2
9 months	75–80°F.	Can—air	5.4	4.7
	75–80°F.	Can—N_2	5.5	4.9
	75–80°F.	Carton	5.3	5.0
12 months	98°F.	Can—air	5.4	4.5
	98°F.	Can—N_2	6.2	5.0
	98°F.	Carton	5.3	5.0
12 months	75–80°F.	Can—air	5.0	4.6
	75–80°F.	Can—N_2	5.2	4.2
	75–80°F.	Carton	5.0	4.4

*The paper packages stored at 98 deg. F. were also exposed to a relative humidity of 93 percent.

Vacuum Sealing Will Retain Vitamin C in Evaporated Milk*

By F. J. DOAN and D. V. JOSEPHSON, The Pennsylvania Agricultural Experiment Station, State College, Pa.

Evaporated milk is indispensable in feeding soldiers at remote military establishments and in nutritional rehabilitation. Low vitamin C content can now be remedied and added vitamin C protected by vacuum sealing

EVAPORATED milk reinforced with vitamin D admittedly contains important quantities of all the commonly known limiting dietary factors with the exception of vitamin C. In addition, it possesses certain advantages lacking in other preserved foods manufactured from milk. It can be stored or held for a longer period of time than any other dairy product; the container is absolutely impervious; it is bacteriologically sterile; it can be used with a minimum of preparation; and last, but by no means least, it is one of the best substitutes for breast milk in the feeding of infants.

The studies reported in this paper point conclusively to the feasibility of fortifying evaporated milk with added ascorbic acid, provided the air commonly sealed into the can is eliminated. The cost of sufficient fortification to insure a vitamin C content of 30 mg. per can after six months' storage (and probably longer) should not greatly exceed 0.15 cent per can or 7.2 cents per case. The result would be a canned milk containing nutritionally important quantities of a dietary factor for which even fresh milk cannot be depended upon and for which natural sources are apt to be expensive, bulky to handle and perishable. Such a product would seem to have great utility in the tremendous problem of feeding the peoples (and especially infants) of the reoccupied countries as the war progresses, and of certain areas of the postwar world.

Vitamin C Loss

Studies dealing with the quantity and stability of vitamin C in evaporated milk and with the feasibility of fortifying the product with added vitamin were undertaken at the Pennsylvania Agricultural Experiment Station in the spring of 1940 with the cooperation of the Evaporated Milk Association, which arranged for procuring commercial samples. As previously reported,[1] a survey was made of the ascorbic acid content of currently manufactured canned milk from 27 widly scattered plants, at four different times.

The greatest amount of ascorbic acid found in any of the more than 100 samples analyzed was 10 mg. per liter, the lowest amount, 0.8 mg. per liter and the average quantity, 4.1 mg. per liter. This would indicate an average loss of over 75 percent of the ascorbic acid originally present in the milk as drawn from the udder. Thus, it appears that the prevailing opinion, which considers evaporated milk a poor source of vitamin C, is correct.

The ascorbic acid content of the commercial evaporated milk usually reached a constant value before it was three months old. In laboratory-prepared milk it was found that almost one-half the original ascorbic acid content of the fresh milk had been lost by the time evaporated milk reached the can.

Another 10 percent was lost in sterilizing and an additional 10 percent had disappeared at the end of the first week. After five weeks of storage, and a total loss of about 80 percent of the vitamin, however, the remaining ascorbic acid was maintained up to one year of age and probably longer. This phenomenon is thought to result from the gradual utilization of the oxygen in the can.

Dehydroascorbic acid, the oxidized form of the vitamin which is nutritionally active but which does not react

* Authorized for publication as paper No. 1195 in the Journal Series of the Pennsylvania Agricultural Experiment Station. Presented before the Food and Nutrition Section of the A.P.H.A. Wartime Conference, New York City, Oct. 12, 1943, under the title "Losses of Vitamin C in Evaporated Milk and a Method of Limiting Them."

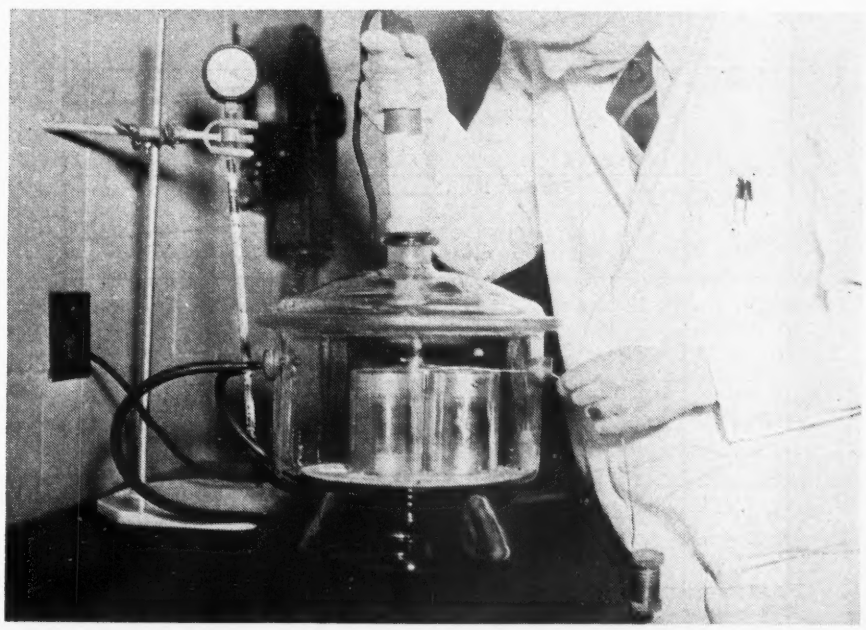


FIG. 1. Laboratory vacuum sealing device, showing the method of manipulating the soldering iron by means of a flexible sleeve. Vacuum connections are at the left, while the fluxed soldering wire is fed in through the rubber stopper at the right in the photograph.

with indophenol in titration, was not found in significant quantities, either in the freshly sterilized product or in the aged evaporated milk. It is not surprising that the oxidized form of vitamin C should be absent in freshly canned milk since its lability to heat treatment is well known. Some dehydroascorbic acid might reasonably be anticipated, however, in aged evaporated milk which has undergone further oxidation of its ascorbic acid subsequent to the sterilizing process. The lack may be explained by the findings of Borsook and his coworkers,[2] which indicate that dehydroascorbic acid is unstable, even at ordinary temperatures at a pH higher than 4.0. It appears, therefore, that the destruction of dehydroascorbic acid in evaporated milk is at a rate high enough to account for practically all that may result from the oxidation of ascorbic acid during storage.

Effect of Removal of Air

A number of laboratory prepared batches of evaporated milk were divided into portions and canned and sealed under varying conditions. Normal milk was sealed in the usual manner and by a technic which withdrew the air from the can and replaced it with nitrogen. The laboratory vacuum sealing device, shown in Fig. 1, is merely a large glass desiccator accommodating three or four 14½-oz. evaporated milk tins at one time. An electric soldering iron is mounted through a rubber stopper in a hole in the center of the lid and sealed with rubber tape in such a way that the iron can be manipulated through a diameter of several inches. It can also be forced down a distance of about half an inch. Fluxed wire solder is forced through a perforated rubber stopper, set in an especially drilled hole in the side of the desiccator and the vacuum is drawn by a laboratory vacuum pump attached to a similar hole on the opposite side of the desiccator. The cans of milk are subjected to a vacuum of about 28 inches for a period of two minutes before sealing.

Samples were analyzed for ascorbic acid at different steps in the manufacturing process and after intervals of storage. A typical comparison of the ascorbic acid content of normally sealed evaporated milk versus that sealed under nitrogen is illustrated by curves one and two in Fig. 2, where the amount of ascorbic acid is plotted against manufacturing operations and age. It will be observed that while the curves for the two methods of sealing the cans are quite parallel, the milk sealed without air maintained more than a 50 percent greater quantity of ascorbic acid throughout the storage period.

The constant vitamin value attained after a month or so of storage, mentioned in connection with the commercial samples, is well illustrated in these curves. The slight increase in ascorbic acid found in the nitrogen sealed milk as a result of sterilization cannot be explained at the present time but it was noted in all trials.

Decrease of Ascorbic Acid in Evaporated Milk after Opening Can.

(Comparison of milk held in can with milk held in glass.* Samples held six months at room temperatur before cutting, and held in ordinary refrigerator at 45 deg. F. after cutting.)

Mg. per liter of ascorbic acid (reconstituted basis **)

Description of samples	When opened	Held in can		Held in glass		Gain — can over glass			
		3 days	7 days	3 days	7 days	3 days		7 days	
Normal milk normal seal	7.05	6.46	4.52	3.44	1.26	3.02	88%	3.26	258%
Normal milk — sealed without air	11.15	9.89	7.62	6.26	2.37	3.63	58%	5.25	221%
Fortified milk — normal seal	34.32	29.38	15.22	22.77	9.62	6.61	29%	5.60	58%
Fortified milk — sealed without air	46.78	44.51	33.65	33.71	20.77	10.80	32%	12.88	62%

* Samples held in can were undiluted — those held in glass were reconstituted to the fluid state.

** To convert these values to milligrams of ascorbic acid per can, multiply by 0.77.

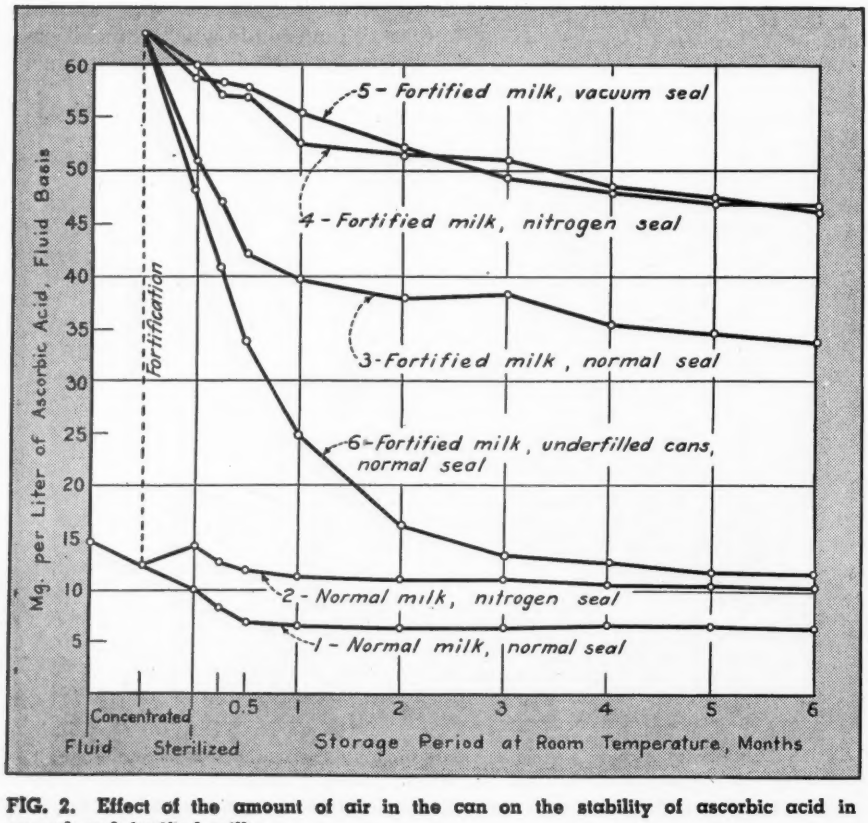


FIG. 2. Effect of the amount of air in the can on the stability of ascorbic acid in normal and fortified milk.

Fortification, Air Removal and Underfilling

In view of the favorable results obtained in limiting the destruction of ascorbic acid in evaporated milk by removing the air from the can at the time of sealing, it seemed that vitamin C could be added to canned milk sealed in this fashion, without experiencing important losses in subsequent manufacturing processes or during the storage period. To test this hypothesis, portions of some of the previously mentioned batches were fortified with pure ascorbic acid at the rate of 50 mg. per liter on a fluid-milk basis. Some of the fortified samples were sealed normally, some were sealed under nitrogen, some under a high degree of vacuum and some were sealed after underfilling the cans by two and one-half ounces to note the effect of a greater than normal amount of air in the can.

The results obtained in these trials were not as favorable as had been anticipated from the findings with unfortified milk. A study of curves 3, 4 and 5 in Fig. 2, and comparison with the curves for the unfortified milk, indicates at once that the degree of oxidation of ascorbic acid in evaporated milk is not quantitatively related to the amount of oxygen in the can, even though the quantity of oxygen is by far the most important factor affecting

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EDITORIALS

LAURENCE V. BURTON, Editor

Prompt Renewal Avoids The Subscription Line

Because there are more people who want to subscribe to FOOD INDUSTRIES than there are subscriptions available, there is a waiting list of more than 500.

This means that you ought to renew your subscription promptly when you receive a notice that it is about to expire. Otherwise, you will have to join those on the waiting list and take your turn. And you will not be able to get your missing copies—we have no extra copies.

The paper shortage—*C'est la guerre*—is to blame. It leaves us with an allotment of paper that already has been curtailed by two cuts. We have not reduced our editorial content, but our circulation has been frozen at the current figure. So we have adopted the policy of cutting off subscriptions promptly on expiration, though not without plenty of advance notice.

Don't wait until the last minute to renew your subscription—you might forget.

The Investigators Are Coming Again

That it was expected will make it none the more pleasant. We refer to the intention of the House Agricultural Committee to make a formal investigation of food distribution costs and methods. Such a move was anticipated as a natural sequel to the Federal Trade Commission's study of the cost of distributing various food products (FOOD INDUSTRIES, January, p. 58; February, p 84).

The House Committee, which is antisubsidy, is looking for an excuse to hold food prices down by squeezing the "water" out of the distribution system rather than by the use of subsidies to farmers. Whatever the reason, those food industries which have high distribution costs apparently are in for a headache. And it would be well for them to start figuring out the answers right away. The answers better be good, too, for it is well known that every-other-day delivery has appreciably reduced milk distribution costs. If costs can be cut in one industry, the Congressman will argue, maybe they can be reduced in others.

Bad Technical Phrasing Confuses Cider Rules

Cider and apple juice packers have had a bit of needless difficulty with the glass container rules of WPB. Correction of this difficulty, which originated in War Food Administration, is being studied and may be accomplished even before this editorial reaches our readers.

Under the container rules of L-103, cider may be packed only in 1-gal. glass jars or larger containers. However, apple juice may be packed in containers of one pint or larger. But cider is the same as apple juice. Naturally the industry was confused and was threatened with many trade difficulties and label changes.

The trouble was that government men intended cider to mean an unpasteurized and relatively perishable form of apple juice. Unfortunately they did not say so. A change to include "pasteurized" and "unpasteurized" in the container rules was being considered during April.

One additional restriction is being urged on behalf of the industry. This is a special proviso that companies which customarily use small containers for an unpasteurized juice or cider may be given special permission to use the same number of small containers as they formerly employed by making special application. Thus the rules would do what was originally intended, prevent an increase in glass container demand from this part of the apple products business. But they would not compel changes in technical and trade practice. Care in rule drafting to that end is desirable in *all* food regulations.

WFA Sets Up Businesslike Plan

War Food Administration has been quite a successful buyer of foodstuffs, but hitherto it has not had good businesslike controls to stop purchases at the right point and to dispose of surpluses when so identified.

Now comes welcome news of a change which is going on steadily but inconspicuously inside the Office of Distribution. Under the direction of M. Lee Marshall, a control system is being established that promises good things both for the food processing industries and the public.

Adequate stockpiles will be built up and maintained. But the word "adequate" is being carefully studied. Excess canned goods already are being released. Future controls promise smaller accumulations of such surpluses. The public will get the benefit of this in more prompt distribution of the goods which can be spared for civilian use. There will be no threat to Army, Lend-Lease or UNRRA supplies. Most important of all from the standpoint of many industries, there will be no breakdown in the normal movement of goods from factory through the trade to the housewife. Thus, without detriment to the war effort, there will be a minimum of inconvenience for Mrs. Housewife.

It looks as though everyone were going to benefit, thanks to experienced business management.

Take Lewis W. Waters As an Example

In the midst of many wartime food problems, the country can ill afford the loss which it suffers in the death of a man such as Lewis W. Waters. As vice-president in charge of research for General Foods Corp., Mr. Waters was one of our better known food technologists.

The contribution that food technologists make to social and economic progress is not yet fully appreciated, either by the public or by the food technologists themselves. The procurement agencies for our armed forces are perhaps alone in their understanding of the great value of the improvements and new

developments in foods, food processes and food packages that come from the brains of the food technologist. They know that foods suited to the purpose and to the locality have played an important part in the success of our fighting men all over the world. Wherever they are the fighters do not go hungry, nor do they suffer nutritional deficiencies. The importance of this cannot be overemphasized.

Civilians take food more or less for granted, even under wartime rationing. In general, they have little appreciation of the contributions food processors and their technologists and engineers make toward the welfare of society. In this connection, it is interesting to consider an observation made by Mr. Waters in 1941. He estimated that 60,000,000 woman hours of work were saved daily in the United States through the use of more ready-to-serve foods and better cooking devices.

But even more important is the better health, the greater pleasure in living, the lower mortality rate among adolescents and the longer life of adults that result from progress in food technology.

Food technologists themselves can and should hold their heads a little higher with pride in their work. And food processors ought to tell the people more of the significance of the work of their food technologists.

Transparent Safety Devices

Transparent safety devices and guards for dangerous machines are not new. Ever since the clear, water-white plastics have been in commercial production they have been used occasionally. Campbell Soup Co. was one of the earliest to put them on food equipment, using Lucite as a guard on a noodle brake so that the operator can see the dough entering the rolls but not touch it.

Wherever an opaque guard reduces a machine operator's efficiency, that place is a good one for a transparent plastic. Also, a machine can now be guarded that heretofore had to be only poorly guarded if it were to be used at all because of the need for visibility of the work.

What Labor Wants

Knowing that this department was soon to meet an important labor leader, a manager of a well-known firm of food processors suggested that the labor man be asked these questions:

"If I knew what labor really wants I would be able to come to an understanding with labor. Does labor want sole ownership of our business? Does it want part ownership? Will it accept the responsibility for keeping our business going? Or is it just raising hell to have something to talk about?"

In substance the reply was this:

"No, we don't want to run your business. We don't know enough to keep it going even if we should own it. All that labor asks for is steady work at as good pay as the business can give, and a voice in determining the working conditions. As far as I have learned from a life-time in organized labor, that is all we ask. You'd think it would be simple to get it, wouldn't you? But business men don't always know or tell the truth regarding their business. So we have to employ economists to learn how much the businesses can pay and then pull a strike to get it. No, we don't want to own or run your business—all we want is a reasonable fair share of its profits."

If this is a reasonable statement of the true desires of labor, then it would seem that there should ultimately come a time, perhaps not too far away, when industrial peace would be the rule, not the newsworthy exception.

Steam Is Lighter Than Air

Apropos of our recent article by Somers on retort venting in canning factories, much verbal discussion has come to our attention. From it comes a constantly recurring theme that deserves repetition here —that steam is lighter than air.

Wherever steam and air occupy the same space, the air will tend to collect at the lowest point. Despite this matter of known fact, there is a tendency among those who erect and operate processing equipment to try to vent out the steam through openings at the top instead of the bottom of the space.

Bottom venting will be more effective and will waste less steam, a fact of importance in this day of fuel shortage.

Pro-coating Problems

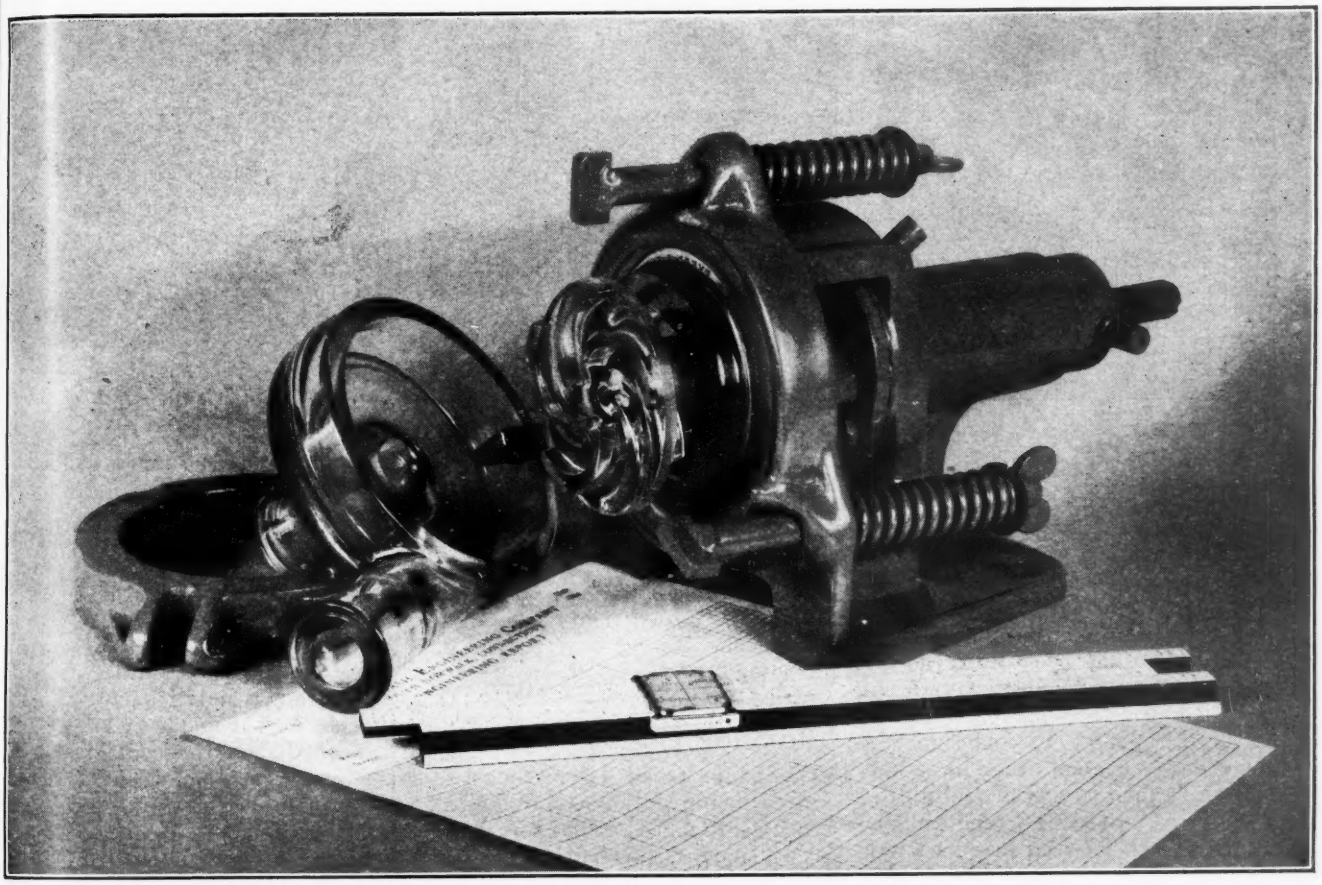
A new term is hereby added to the technical vocabulary of food technology—"pro-coating," which is the short for "protective coating." It means the operation of coating a metal container with O. D. paint (olive drab to civilians) so that it will not only be protected from the elements but also will be camouflaged from aerial observation. In the eyes of the enemy aviator, where there are cans there may be life.

Apparently the right combination of solvents has been developed to permit the rapid evaporation needed for a mechanized operation, while the right pigments have been known for some time. But canners holding Army contracts have certain fears as to when to do the job. Preferably it should be done immediately after processing and cooling, but there are some who fear to act so promptly. If there must be a prolonged delay between cooling and pro-coating, it means double handling of millions of cans and consequent added expense, to say nothing of extra labor that is difficult to find.

These fears are based on some earlier experience in which the volatile solvents found their way into the cans, apparently penetrating the seams through the gaskets while they were still in a soft condition as a result of the heat process. An opposing view is that the newest form of gaskets for cans is a notable improvement over those which existed only last year, and that there need be no hesitancy. Nevertheless, the cautious ones feel that research must determine the safety of immediate pro-coating.

It is still too early to determine the postwar future of pro-coating, but there is a distinct possibility that it may be an important adjunct to the use of very thin electrolytic tinplate, thereby avoiding all possibility of rusting and also adding a pleasing color to the can. Costs probably will be an important factor in its future. Speed seems to be a lesser problem, for one mechanized operation was doing about 160 No. 10 cans a minute.

Made of "PYREX" Brand glass, and no longer than a slide rule, this pump handles 600 gallons an hour



Ideal for small capacity installations, laboratory and pilot plant operation, this little brother of our big Nash Centrifugal Pumps of "PYREX" Brand glass nicely handles 10 gallons of liquid per minute with the assurance that the material pumped will not be contaminated by contact with the pump structure.

Whether your process involves hot solutions, brine cooled liquids, or fussy products you want to protect from an "off" flavor, this pump is equally reliable and will render twenty-four hour service without too much watching.

All working parts of this pump, including impeller and casing, are constructed entirely of clean, sparkling "PYREX" Brand glass. The pump is fully transparent, and permits constant inspection of liquid being handled, for color, condition, etc. If the pump needs cleaning it is immediately made visible, and it can be opened, cleaned and reassembled in a comparatively short time.

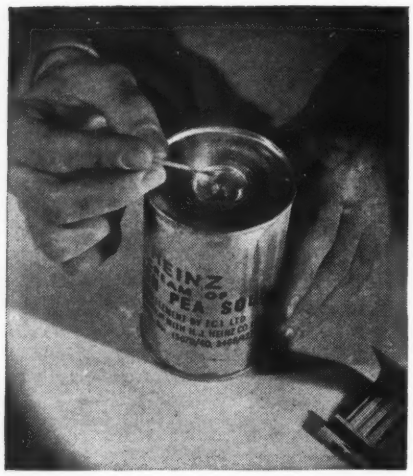
A unique mechanical seal replaces the conventional stuffing box, and a safety unloading device eliminates possibility of fracture of the glass casing should the pump be accidentally subjected to excessive pressure. An iron housing protects the glass structure from external shock. With due consideration for the fact that it is glass, you will find this a durable piece of equipment.

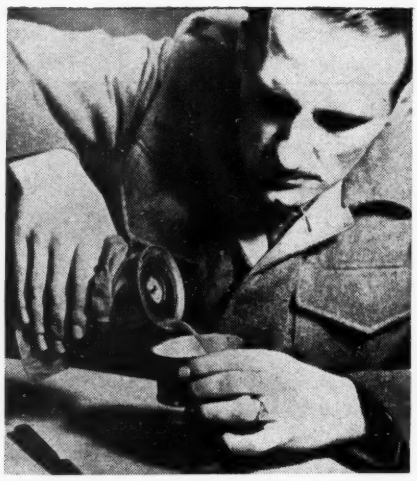
Write for Bulletin No. 336, which describes this sensational pump in detail. If interested in larger capacity Nash Centrifugal Pumps of "PYREX", ask also for Bulletin 313.

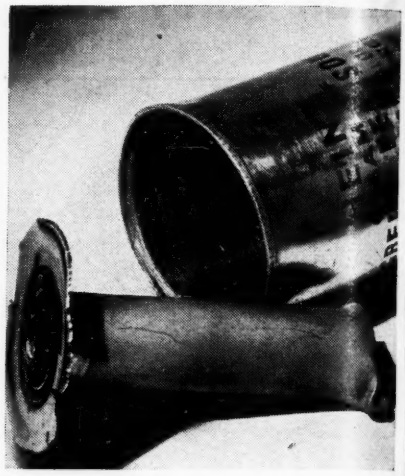
NASH ENGINEERING COMPANY

267-A WILSON ROAD, SOUTH NORWALK, CONNECTICUT

NEW PACKAGES & PRODUCTS







Self-heating Soup

SOLDIERS in the field can have steaming hot soup in about five minutes simply by lighting a fuse found under the metal cap of the can of self-heating soup packed by H. J. Heinz Co., Ltd. The new can, which resembles a regular No. 2 can, has been developed by Imperial Chemical Industries, Ltd., in collaboration with Heinz for American and British troops. In cold climates, the soldiers sometimes tuck these hot cans inside their jackets as a substitute for hot water bottles. Several million cans already have been manufactured for the American Army in England.

To heat the soup, two holes are punched in the lid before the fuse is lighted. The fuse ignites a chemically treated fiber contained in a small metal tube in the center of the can. The pictures show the fuse being lighted, a British soldier pouring the soup from the can, and the heating element removed from the can.

Wartime Packages

BURRY BISCUIT CORP., Elizabeth, N. J., and Mrs. L. M. Peterson & Co., Inc., Brooklyn, N. Y., a subsidiary company, are now packing several of their cracker products in Sealright spiral-wound cylindrical paper containers. These replace the round tin cans formerly used.

There has been no change in the shape of the packages, and the labels are identical to those on the tin cans. The cardboard containers, made from a commercially sterile sheet of paperboard containing virgin pulp, are constructed under rigid standards of bacteria control. They are made moisture-resistant by a hot paraffine bath. The cover is the slip-over type, which fits tightly yet is easy to remove; it also is effective as a reclosure. A fluted glassine liner fits loosely into the cover and the crackers are packed in fluted glassine cups.

As a wartime note, the letter V and the words, "Sealed right—kept right, our wartime package," are printed on the cover.

Vita-Snak Candy

VITA-SNACK, a new 1¼-oz. chocolate-coated vitamin and mineral candy bar, is being introduced by Mason, Au & Magenheimer Confectionery Manufacturing Co., Brooklyn, N. Y. This balanced food in candy form carries 12 vitamins and 8 minerals. The product contains chocolate, dried fruit, peanuts, oatmeal, dicalcium phosphate, soybean meal, dextrose, invert sugar, salt, vegetable oil, lecithin, artificial flavor, vitamins and various minerals.

The bar is supported by a brown paperboard tray and has an inside white kraft paper wrapper with an outside waxed glassine wrapper printed with the manufacturer's label.

Shortening in Paper

BAKERS, hotels and restaurants will find Procter & Gamble's 50-lb., square, corrugated-fiberboard container with a parchment liner an efficient package for storing and handling large quantities of shortening. This cubical container is sturdily constructed, so that the fat is delivered in a clean and sanitary condition, and without leaking. Its shape makes it easy to handle and convenient to store, which means more economical use of storage space than is usually possible with cans or drums. Because it is fastened to the

WHICH CAP DESIGN WILL BUILD THE MOST REPEAT SALES?

Yes, a cap can help build repeat business, when you take advantage of that sizable advertising space on its top. Your customers see that space every time they use your product. So they can't help remembering your name, or trade-mark, when you put it on the cap.

What's more, a colorful, distinctive cap design helps customers spot your package more quickly in the store. It lifts your package out from among today's standardized containers, makes your brand easier to see—and buy.

Naturally, the better your cap design, the better it will sell your product. Working out hard-selling designs for Armstrong's Metal Caps has been a specialty with us for years. We'll be glad to show you, free of charge, how much extra selling punch we can add to your caps. Just drop a note, and a sample of your present package, to Armstrong Cork Company, Glass and Closure Division, 4205 Prince Street, Lancaster, Penna.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

"A PATCH OF OVERCAST NORTHERN SKY" . . .

a colorful item in research's tireless quest for better glass

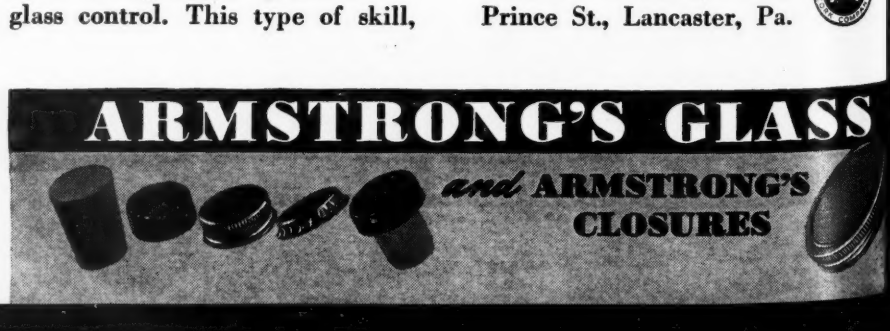
FOR years, glassmakers made sure their flint bottles were really colorless by viewing them against the light of an "overcast northern sky." This clear, cold light quickly showed up even the faintest trace of undesirable color.

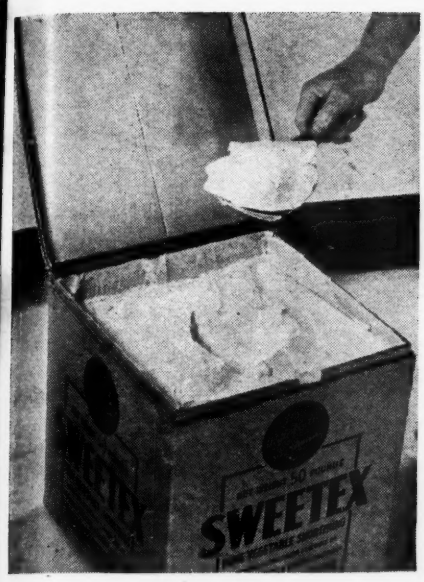
But an "overcast northern sky" is not always available when it's needed. And in Armstrong's laboratories, where research in glass is going on all the time, it was important to have a convenient method for immediately checking experimental glass for color.

So Armstrong's research men brought a patch of the northern sky indoors! They designed and built a simple "viewing box" which exactly reproduced the revealing northern light. By scientific combination of the proper light sources, diffusion surfaces, and reflecting materials, they created a nonglaring, uniform, high-precision light. Now bottles can be checked for color purity any time, at the flip of a switch, in either Armstrong's laboratories or Armstrong's glass factories.

This "viewing box" is a modest example of the ingenuity with which Armstrong's research men solve the practical problems of glass control. This type of skill, backing up long years of technical training and experience, helps account for the success of Armstrong's chemists, engineers, and physicists in making and keeping Armstrong's glass top quality.

Further interesting sidelights on the skill and experience that go into the making of top-quality glass are contained in Armstrong's illustrated book, "Men and Glass." For your free copy, write Armstrong Cork Co., Glass and Closure Division, 4205 Prince St., Lancaster, Pa.

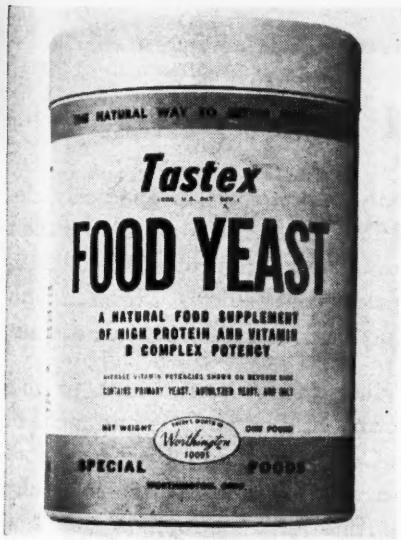




sides of the package, the liner cannot collapse or pull out when it is scraped down. The 50-lb. cube is easy to unwrap when the whole cube is needed at one time. When only a small amount of fat is required, the package is opened by cutting around three sides of the top.

Enricher for Housewife

A NEW PRODUCT which, for the first time, makes it possible to add B-complex vitamins to home-cooked foods is being put on the market in 1-lb. packages by Special Foods, Worthington, Ohio. This food supplement,



valued also for its high protein content, is called Tastex Food Yeast.

Consisting of pure primary yeast and autolyzed yeast, with salt added, the product can be combined with almost any home-cooked dish without affecting the flavor. It mixes readily with the ingredients of pies, cakes, dressings, omelets and gravies. A single tablespoonful is said to supply 99 percent of the average daily requirement of vitamin B_1, one-fourth of the daily need of riboflavin and 20 other vitamins, including all of the B-complex group.

Dehydrated Spinach

LITTLE & CO., INC., Chicago, has put Kwik-Dri dehydrated spinach on the domestic consumer market. Containing a meat-base seasoning, it is ready to cook. The spinach is packed in 1¼-oz. chipboard containers with laminated glassine linings and with tinplate tops and bottoms. There are 48 of these packages in a carton case.

Made of spices and a meat base, the seasoning in the spinach is in tablet form.

New GI Packages

FIGHTING GI's in combat zones will be receiving their "K" rations in new packages as soon as the packaging program developed by the Office of Quartermaster General gets under way. Each meal in the ration will be readily distinguishable from the other by the design and color of the outside paper carton.

Working on the theory that an attractive package lends interest to any product, especially a food product, an effort has been made to give Ration "K" more appeal than hundreds of other GI packages. Under the new program, the carton containing the breakfast unit of the ration is printed in brown, dinner in blue and supper in green, each carton bearing a different design. In this way a soldier grabbing a packaged meal from a large packing case of rations can easily tell which unit he is taking. This method of packaging also should facilitate operations in the food plant packing the rations.

Don't get caught with a Label Shortage

CALL ROSSOTTI for LABELS

While we can still supply you

Yes—we can still fill your needs. But already labor and paper shortages and other conditions have slowed down our usually prompt service. So . . . if you want to be sure of your label supply for the coming season, contact Rossotti now!

COMPLETE SERVICE

The ROSSOTTI organization offers you a completely integrated coast-to-coast service on Fine Labels as well as Package Wraps and Folding Cartons—from sketch to finished products. Complete Art, Production and Merchandising Counsel.

Why not call in a ROSSOTTI Packaging Counsellor for a constructive discussion of your individual requirements? Or drop us a line at our nearest office. Ask for samples of ROSSOTTI De Luxe Stock Labels for quick last minute rush orders.

Rossotti Lithographing Company, Inc.

NORTH BERGEN, NEW JERSEY

177 Milk St., Boston 9, Mass.

MIDWEST DIVISION
Rossotti Midwest Lithographing Corp.
520 North Michigan Ave.
Chicago 11, Ill.

WEST COAST DIVISION
Rossotti West Coast Lithographing Corporation
255 California Street
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AMOCO MOTOR OIL
Goes to the front in these special containers.

Service Station at the front

No computing gas pumps . . . no "Clean Rest Rooms" . . . and if you're talking about "free air" you mean a sky swept free from enemy airplanes.

But that's the sort of wartime service station to which Amoco Motor Oil is being delivered today . . . delivered by the efforts of the Navy and the Coast Guard to help maintain the Army's motorized equipment.

And when Amoco Motor Oil travels to the front . . . it travels in specially designed Crown kits . . . about five-gallon steel containers that protect the oil from sea water and sand . . . from rough handling under battlefront conditions.

Supplying those containers to the American Oil Company is one more of Crown Can's wartime jobs . . . one more way an organization that so faithfully served America's peacetime needs is pitching in to help speed victory!

CROWN CAN COMPANY, New York • Philadelphia
Division of Crown Cork and Seal Company, Baltimore, Md.

★ ★ ★ ★ CROWN CAN ★ ★

FOOD INDUSTRY NEWS

DEVELOPMENTS IN DISTRIBUTION

Short Materials Reviewed At Packaging Conference

Only glass and some plastics will be in adequate supply, according to consensus at Chicago meeting

CERTAIN plastic products and some glass containers are the only packaging materials likely to be in adequate supply this year, according to the consensus of a panel of experts meeting at the Packaging Conference and Exposition in Chicago. Paperboard and its products are the most critical items in the war economy in the opinion of W. L. Davis, assistant director of the paperboard division of WPB. Unless industry and the public eliminate its unnecessary use, the supply of paper board will not be adequate for all requirements. Mr. Davis said that England is currently salvaging 85 percent of its waste paperboard while we are recovering only 33 percent of ours.

The one bright spot in the packaging picture will see production of 98,500,000 glass containers in 1944. Robert Dillman, packaging engineer for Libby, McNeill & Libby, predicted that the present backlog of orders will be gradually reduced. The plastics industry has thus far been able to maintain output on a relatively high level through ingenious planning, according to C. Rector, director of the plastics section of WPB.

For the other materials—metals, textile bags, closures and wood—the outlook is dubious at best. Despite reports that steel is relatively easy, E. J. Detgan, acting director, containers division, WPB, reported that sheet steel, the form required for containers, is in critically short supply and is likely to remain so throughout the third quarter. There was some hope, he thought, that the situation might be eased by August. Tin, Mr. Detgen said, is neither better nor worse than it was.

Textile bags will be short, according to F. H. Ludington, president, Chase Bag Co., because there will not be enough cotton and burlap to produce the required amounts. The metal cap picture might improve as far as metal availability is concerned, declared Robert Peck, containers division, WPB, but the shortage of other raw material, such as paper and adhesives, may counteract this improvement.

A critical situation in wood containers was painted by E. E. Ames, vice-president in charge of sales, at General Box Co. The use of lumber, he pointed out, for boxing, crating and dunnage rose from 5,500,000,000 board feet in 1941 to 16,500,000,000 in 1943. During this same period production of lumber has declined and inventories are now down to what is considered an irreducible minimum.

How Paper Is Salvaged

Practical plans for paperboard salvage were discussed by representatives from various diversified industries, who told what their companies were doing to ease the situation. A plan was launched at the Kroger Grocery & Baking Co. under which the oldest employees in length of service were appointed waste wardens and given the task of policing the stores and factories to eliminate waste. After two weeks the wardens relinquished the job to their immediate juniors. After a careful study, Curtiss Candy Co. changed specifications of its containers, which resulted in a 33⅓ percent saving in chipboard. A further saving was achieved by shipping goods in cubical cartons wherever feasible. In addition, the Curtiss company reclaimed and reused 4,000,000 boxes and cartons. In the past year Swift & Co. has discontinued packing a great number of small packages, concentrating on the larger, labor saving sizes.

Other Pertinent Points

The increasingly important role that resin adhesives are playing in the fabrication and treatment of protective and utility packaging materials was outlined by Sidney Thune of National Starch Products, Inc. He asked that resin adhesives be considered not as cure-alls, but as added weapons for the packaging engineer; it was the search for such weapons that led to the use of resins.

Present speeds of packaging machinery must be increased three or four times, Douglas Kirk, of the Quaker Oats Co., told the manufacturers group. He added that, wherever possible, movable parts should be dispensed with and greater simplicity of operation sought.

Because of the need to conserve containers and shipping space, a host of quality dehydrated foods is now being produced, declared M. A. Williamson, publisher of FOOD INDUSTRIES, in the opening address of the conference. "In vegetables alone," Mr. Williamson said, "the industry has grown in a little over a year and a half, from 18 plants producing some 20,000,000 lb. dry wt. to 133 plants producing over 200,000,000 lb. The speaker also predicted a growing market for quick-frozen foods, both in individual items and combinations in precooked forms. Because of the higher costs of distribution, however, he thought the trend was likely to be toward the quality market.

CANADIAN WHEAT INSPECTION

Inspectors of the Canadian board of grain commissioners are shown here examining wheat grain. Their job is to classify the grain by quality, to report the presence of disease, and to assist generally in maintaining the high standards required of the Canadian wheat market. The United States proposes to buy 175,000,000 bu. of Canadian wheat during 1944 if transportation facilities remain available.

Small Meat Packers Seek Better Controls

To strengthen the cause of the small operating companies for price controls that would permit operation on an equitable basis with large operators, the National Independent Meat Packers Association met April 12, 13 and 14 at the Morrison Hotel, Chicago.

Need for immediate action on obtaining fair spreads for the packing industry, removing lard from the "distress price" commodity list, and relieving the critical manpower shortage was cited by Wilbur La Roe, Jr., general counsel for the Association. Small operators feel the need for a larger margin of profit compared with those packers who are able to sell through branch and hotel supply houses, to buy choice cattle at higher prices than the small packers can pay, and to utilize their numerous by-products; a field untouched by the small packers.

1944-45 officers elected at the meeting are:

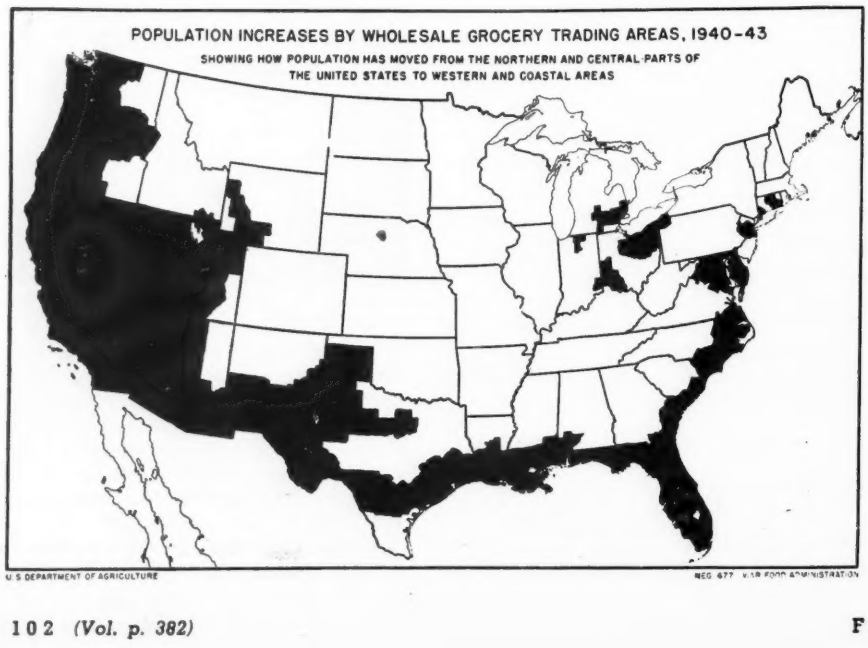
President, Fred M. Tobin, Tobin Packing Co., Rochester, N. Y.; chairman of the board, George L. Heil, Jr., Heil Packing Co., St. Louis, Mo.; first vice president, Earl L. Thompson, Reliable Packing Co., Chicago, Ill.; treasurer, R. A. McCarthy, Beach Packing Co., Huntington Beach, Calif.; secretary-assistant treasurer, C. B. Heinemann, Washington, D. C., (reelected).

Food Markets in U. S. Shifted by the War

IMPORTANT wartime population changes have occurred in the United States, and they materially affect the distribution activities of food processors. Since 1940 huge masses of people have migrated from the interior of the United States to war industries, especially those located on the southern and western seaboards. Important shifts in markets have resulted. New York State alone has lost over a million customers; California has gained a million. Rural counties, almost without exception, have lost some of their population to war-busy cities such as Detroit, San Francisco, Baltimore, Seattle, Mobile, San Diego, Norfolk and St. Louis.

The civilian population of the country as a whole has declined by about 4,000,000, or 3.1 percent, largely as a result of the growth of the military forces.

The accompanying map shows the population shifts. It is from "Highlights of Population Shifts," which may be obtained from the Office of Distribution, War Food Administration, Washington 25, D. C.


POPULATION INCREASES BY WHOLESALE GROCERY TRADING AREAS, 1940-43
SHOWING HOW POPULATION HAS MOVED FROM THE NORTHERN AND CENTRAL PARTS OF THE UNITED STATES TO WESTERN AND COASTAL AREAS
U.S. DEPARTMENT OF AGRICULTURE
WAR FOOD ADMINISTRATION

WFA Allocates Food For 2nd Quarter

MORE butter and slightly less meat will reach civilians during the period April through June, according to the WFA quarterly food allocations. The civilian allocation for the period is 432,000,000 lb. as compared with 410,000,000 lb. for January through March. WFA officials anticipate that government purchases of butter during May and June will be considerably less than last year, when the set-aside percentage for the quarter ranged from 30 to 50 percent. The set-aside percentage for this past April was 10 percent.

The civilian meat allotment of 4,485,200,000 lb. for the April-June period compares with 5,091,300,000 lb. for the previous quarter. It is thought, however, that there will be little or no difference in the quantity of meat available during the two periods.

More Cheddar cheese and about as much evaporated and condensed milk are allocated in the April-June quarter as civilians enjoyed in the January-March period. Edible fats and oils show a slight increase except for margarine, which dropped from 120,000,000 lb. for the last quarter to 103,000,000 lb. for the current period. Shortening and oils rose from 427,000,000 lb. to 440,000,000 lb., and lard remained at 455,000,000 lb.

Paper Labels on Cans Are Banned By Army

LABELS are to be eliminated from cans of food packed for the government, according to an early April announcement by the Quartermaster Corps. Instead of paper labels, packers are required to print or lithograph the cans with statements as to contents. If the facilities are available, the packers must also use a rust resistant paint or lacquer to protect the outer surface.

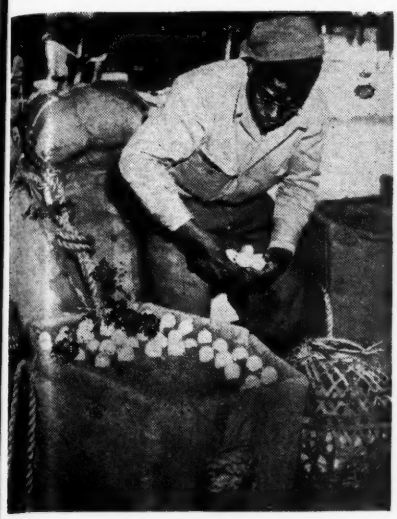
The Quartermaster Corps is endeavoring to have coating facilities provided in all canneries in order to ship overseas requirements of canned foods in coated cans (See page 85). In the event the can coating program cannot be entirely completed, uncoated cans, properly marked, but without paper labels, will better meet climatic conditions in overseas theaters, in the opinion of Quartermaster officers.

Dehydrated Products Allocated by WFA

A LITTLE over 246,000,000 lb. of dehydrated vegetables is expected to be available during 1944-45, declared WFA in announcing the allocations for the period from July 1, 1944, to June 30, 1945. More than 95 percent of the total has been allocated to noncivilian claimants, the small civilian portion being confined almost wholly to soups.

White potatoes, with 144,000,000 lb. expected to be available, comprise nearly half of the anticipated supply. The U. S. armed services will get about 78 percent of this total, Britain and Russia about 18 percent and U. S. civilians slightly more than 3 percent. The remainder will go to other exports. Requirements for all claimants for dehydrated soups and vegetables are expected to be about 423,000,000 lb., with 150,000,000 lb. going to U. S. civilians.

For the first time in any food allocations, figures were given for a reserve for liberated areas. In this instance



EGGS BY PARACHUTE

These eggs are being packed for dropping by a 14-ft. parachute in the jungles of Burma where other means of delivery are impossible. More than 200 eggs are packed in each basket with an abundance of rice husks instead of sawdust to absorb the shock of landing.

2,000,000 lb. of dehydrated onions and 2,000,000 lb. of dehydrated garlic were set aside for that purpose.

These quantities do not indicate anticipated production, as much larger stocks of dehydrated vegetables are being carried into the new producing season than were on hand last year.

SCHEDULE OF EVENTS

MAY

3- 5—Society of American Bacteriologists, annual meeting, Hotel Pennsylvania, New York City.
9-10—American Spice Trade Association, thirty-eighth annual meeting, Hotel Astor, New York City.
10-12—American Oil Chemists Society, 35th annual meeting, Hotel Roosevelt, New Orleans, La.
15-16—American Society of Brewing Chemists, second wartime meeting, Edgewater Beach Hotel, Chicago.
21-22—National Association of Flour Distributors, annual convention, Hotel Carter, Cleveland, O.
21-22—New England Bakers Association, annual meeting, Hotel Statler, Boston.
22-23—Associated Retail Bakers of America, war conference, Hotel Sherman, Chicago.
22-23—Flavoring Extract Manufacturers Association of the U. S., annual meeting, Hotel New Yorker, New York City.
23-25—American Association of Cereal Chemists, 30th annual meeting, Hotel Nicollet, Minneapolis, Minn.
29-31—Institute of Food Technologists, 5th annual meeting, Edgewater Beach Hotel, Chicago.

JUNE

4- 7—National Association of Retail Grocers, forty-sixth annual convention, Palmer House, Chicago.
5- 7—American Society of Refrigerating Engineers, 31st spring meeting, William Penn Hotel, Pittsburgh, Pa.
6- 8—National Confectioners Association, war conference, Hotel Waldorf-Astoria, New York City.
14-15—Grocery Manufacturers of America, mid-year meeting, Hotel Waldorf-Astoria, New York City.
18-21—Super Market Institute, annual meeting, Hotel Sherman, Chicago.
21-23—American Dairy Science Association, Ohio State University, Columbus, O.

We didn't have a machine for this packaging job

—But we designed and built one in jig time

When peace comes you'll find this sort of designing and machine-building skill worth calling on

As you witness the accomplishments of various companies in the war effort, you are no doubt making mental notes of those organizations that are doing the sort of things which may prove of value to you in peace-time . . . We believe, therefore, that this clip-loading machine will interest you as a user of packaging machinery. For it shows: (1) the ability to think fast; (2) to design simply and practically; (3) to build machines quickly and in quantity.

With just a few clips and cartridges for experimenting, we designed and built the first clip-loading machines in three months' time. The machine for Springfield clips loads 150 clips per minute; the machine for the Garand, 70 clips per minute.

Batteries of these machines are now in use—and they are by no means the only armament machines we have created.

It's work of this type, as well as the building of wrapping machines for manufacturers who are supplying the armed forces, that will lead to new and better peace-time packaging. We are working on ideas right now, and will be glad to study any new developments you may have in mind.

PACKAGE MACHINERY COMPANY
Springfield 7, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

PACKAGE MACHINERY COMPANY
Over a Quarter Billion Packages per day are wrapped on our Machines

Dairymen Look Ahead As Production Drops

VIEWING governmental efforts to prevent a continued decrease in production of fluid milk during the war period as a warning. The American Dairy Association held its Fifth Annual Meeting in Chicago on April 10 to 12 as a postwar mobilization rally.

Faced with a decrease in fluid milk production from 119,240,000,000 lb. in 1942 to an estimated 116,000,000,000 in 1944, (2,000,000,000 lb. less than in 1943) when strenuous efforts are being made to increase production, plans to prevent an industry collapse under peacetime conditions were outlined.

Owen M. Richards, manager of the American Dairy Association reported that "If America consumed the quantities of dairy foods recommended by health authorities for best nutrition, the nation would need annually 65,000,000,000 lb. of milk more than the 115,000,000,000 to 119,000,000,000 lb. produced over recent years for heavy wartime demands." That production would require the increase of dairy cows from the present record herd of approximately 27,000,000 to about 42,000,000 head."

Lab On Wheels Tests Food for Army Corps

A MOBILE, selt-contained food-testing laboratory will be placed in service before the start of the 1944-45 canning season by the Quartermaster Corps. It will make possible the periodic examination of canned and dehydrated foods and of the plants which produce them for the Army. Checks will be made to determine the presence of certain types of spoilage organisms which are especially resistant to customary processing methods and are significant only when canned goods are stored at tropical temperatures.

Chicago Group Told Cheese Plant Needs

IMPROVEMENTS in methods, equipment, and sanitation in the cheese industry were emphasized by Dr. W. V. Price, Department of Dairy Industry, University of Wisconsin, speaking at the April meeting of the Chicago Dairy Technology Society.

Particular stress was put on the need for scientifically trained and technologically experienced chemists, biologists and sanitarians in cheese plants. Existing equipment was described as lacking in durability, of objectionable construction, and being difficult to keep sanitary. Need was expressed for more equipment of stainless steel, also possibly of aluminum and of glass composition, of simple and easily dissembled construction and of closed or covered design which would help keep out extraneous materials and make cleaning easy. Advantages of and need for improved "starters," for systematic and more frequent distribution of "starter" cultures, for better cooling equipment and practices, heating or cooking controls, pasteurizing units, testing methods, and aging practices were also discussed.

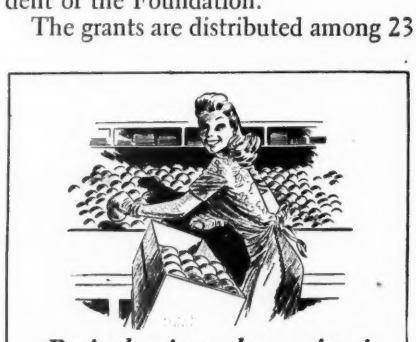
Potentialities of a continuous method of cheese making under automatic time and temperature control operation were summarized in terms of new cheese factories to be built to replace the 50 to 75 per year that are being forced out of existence by present day operating conditions.

Nutrition Foundation Makes College Grants

GRANTS of $131,000 for research projects in nutrition were made by the Board of Trustees of the Nutrition Foundation, Inc., at a meeting held in New York last month, it was announced by George A. Sloan, President of the Foundation.

The grants are distributed among 23 colleges and universities in the United States and Canada. They include renewal of grants for 31 research projects already in progress and three additional grants for studies at Harvard, Yale and Cornell.

Mr. Sloan stated that the Foundation also has taken action looking towards assisting, as far as possible, in the postwar placement of research trained personnel.



HELP FOR CITRUS PACKERS

This is one of a series of advertisements being placed in southern California newspapers by the Food Machinery Corp. They urge women to take employment in the citrus packing plants of the area to help with the bumper orange and lemon crop.

Home Canning Centers Permanent in Georgia

DECLARING that community food preservation centers are permanent institutions in this country, Paul W. Chapman, dean of the College of Agriculture, University of Georgia, told the Food Preservation Workshop Conference, held at Peoria, Ill., that Georgia had 500 such centers now in operation. "All these plants are housed in permanent locations," he said, "the majority in buildings erected for that purpose." All are supplied with modern labor-saving equipment for canning foods, according to Mr. Chapman, while 34 plants also operate large, community-size dehydraters. In addition, a number of the centers are provided with all facilities for curing meats.

"Georgia did not build these plants to meet the requirements of any emergency," Mr. Chapman declared.

Quartermaster Corps Issues Food Grades

THE following food specifications have been issued recently by the quartermaster corps. They are listed with the Chicago Quartermaster Depot number and date of issue.

Dehydrated Soups, C. Q. D. 26B, March 2, superseding C. Q. D. 26A. Evaporated and Canned Milk, C. Q. D. 174, March 3. Processed Cheese, C. Q. D. 91A, January 31, superseding C. Q. D. 91. Frozen Egg and Frozen Egg Products, C. Q. D. 169, January 31; Ten-in-one ration, C. Q. D. 140A, March 6, superseding C. Q. D. 140. Prepared Breakfast Cereals, C. Q. D. 175, March 9, to be used in lieu of Federal Spec. N-C-196. Dehydrated Carrots, C. Q. D. 73B, March 15, superseding C. Q. D. 73A. Canned Beans with Pork, C. Q. D. 51B, March 22, superseding C. Q. D. 51A.

Exposition in November

SPONSORED by the Chicago Section of the American Chemical Society, the third National Chemical Exposition will be held Nov. 15 through 19, 1944 at the Chicago Coliseum, it is announced by M. H. Arveson, Chairman of the Exposition Committee.

RAW MATERIALS

Outlook for Wheat Greatly Improved

BASED upon the condition of the crop on April 1, the production of winter wheat is estimated at the encouraging figure of 610,795,000 bu. by the Department of Agriculture. That figure is higher than last year's harvest by 72,000,000 bu. Late last fall, a crop of only 527,000,000 bu. was indicated, but the lack of moisture which led to that pessimistic outlook has been largely corrected.

In spite of the improved outlook, a tight wheat situation is expected for the coming season. In the year ending June 30, the total disappearance is estimated at 1,260,000,000 bu., the greatest in our history. This would mean a July 1 carryover of only 300,000,000 bu., little above the minimum safe wartime level.

Food Research Told To Chemical Society

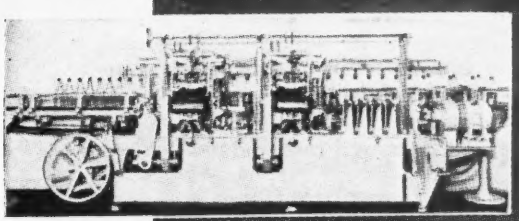
WARTIME RESTRICTIONS of raw foods were reflected in the deliberation of the Agricultural and Food Division of the American Chemical Society in Cleveland, last month.

Two procedures, mechanical and chemical, for producing starch from wheat flour were outlined by R. J. Dimler and C. E. Rist, Northern Regional Research Laboratory, Peoria, Ill. Details of these processes, data on the yields and purity of the products were discussed.

The total world production of molasses, excluding Russia, had attained 1,200,000,000 gal. per year immediately preceding the war, declared Peter G. Berdeshevsky, consultant, New York. New uses and enlarged production of alcohol have used up easily available supplies, but a long delayed contract has at last been concluded with tropical producers, at approximately three times the prewar price. If tankers can be provided, molasses sufficient to produce 2,300,000 gal. of alcohol should be available in 1944 .

In a cooperative investigation on the use of grains other than corn for the production of high-proof alcohol, Leonard Stone, of Hiram Walker & Sons, Inc., Peoria, Ill., and Harold Roland, of WPB, reported that early data indicated conversion to wheat would reduce alcohol and byproduct recovery by 15 to 20 percent as compared with corn. This was partially offset by the use of granular wheat flour and development of optimum

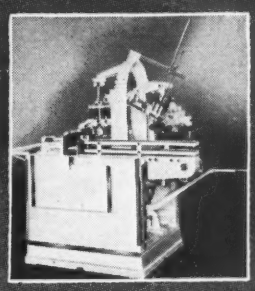
ARE You Keeping Up With the WORLD?



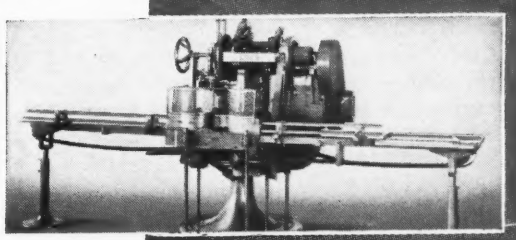
It's one thing to say to yourself, "Of course, we'll have to have a modern labeling set-up as soon as the emergency is over." But, judging from what so many top-notch producers of labeled goods are doing, it's much wiser to get a definite line on the one best Labeler for the job now instead of waiting until the last minute.

As the largest and longest established specialists in Labelers, WORLD labeling headquarters stand ready to work out detailed recommendations and estimates that will dovetail neatly into your planning program. Now is the time to get the story. Won't you get in touch with us?

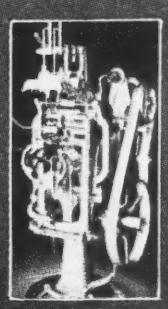
The WORLD Automatic BEE-LINE Straightaway Labeler



The WORLD Automatic TURRET Labeler



The WORLD Automatic ROTARY Labeler



The WORLD Model Semi-Automatic Labeler

Which is best in the WORLD for *YOUR* Labeling?

A few simple facts about your production, containers and labels will quickly determine the right answer. Let us work it out for you—now.

ECONOMIC MACHINERY COMPANY

Builders of World Automatic and Semi-Automatic Labelers for Every Purpose

Worcester, Massachusetts

NEW YORK PHILADELPHIA PITTSBURGH CHICAGO SAN FRANCISCO DENVER LOUISVILLE
SALT LAKE CITY EL PASO SEATTLE PORTLAND LONDON MONTREAL TORONTO WINNIPEG
SPOKANE VANCOUVER SYDNEY, AUSTRALIA WELLINGTON, N. Z. SAN JUAN, P. R.

operating conditions for wheat. Depending upon available equipment, alcohol yields on corn give 4.9 to 5.1 proof gallons per bushel, whereas wheat gives 4.5 to 4.8 and granular wheat flour, 5.4 to 5.6, all on a 56-lb. basis.

Kaffir corn, or Milo-maize, wheat and barley have been more or less successfully utilized as emergency materials for the adjunct fraction of brewers and malt sirup manufacturers' mashes, according to G. C. Baker, of Pabst Brewing Co., Peoria, Ill. Their use, however, is limited to only a fraction of the adjunct portion, and special processing is necessary, especially for finishing operations in the manufacture of cereal beverages. Rye and oats proved to be unsatisfactory.

Wheat and Potatoes Used for Alcohol

CALIFORNIA WINERIES, which have utilized more than 20,000,000 gal. of Hawaiian molasses in the production of alcohol, plan to continue manufacturing alcohol by using surplus stocks of Canadian wheat and substandard grades of potatoes, held by the American government, as raw materials.

Announcement that some of California's largest wineries are being converted to permit usage of grains and potatoes in the manufacturing process was made in San Francisco recently by H. A. Caddow, secretary-manager of the Wine Institute. Mr. Caddow said the changeover was necessitated by an impending shortage of molasses from Hawaii.

Mr. Caddow said that pilot-plant tests have shown conclusively that this is a practicable and efficient operation. He estimated that as much as 2,000 tons of potatoes can be handled per day. If grain is used as the raw material, 25,000 bu. per day can be converted to sugar sirup. From this can be obtained daily in excess of 125,000 proof gallons of war alcohol.

Stocks of Spices Are Up 22 Percent

OUR supply of food seasoning materials is higher today than ever before, according to information released by the War Food Administration and the American Spice Trade Association. Although shortages are reported in certain spices that cannot be grown in neutral or United Nations countries due to unfavorable climatic conditions, a 22 percent overall increase in spice stocks is reported because of larger amounts domestically raised and a stepping up of imports.

Seven of our own states are now producing needed spices, such as paprika, sage, mustard, cayenne and basil. And as a result of the war, spice growing has been made profitable in South America.

Price Support Makes Both Glut and Famine

PRICE SUPPORT programs of WFA have produced opposite effects for corn and eggs. There is a corn famine but a deluge of eggs. Both are embarrassing to official Washington.

Explanations are legion. One fact seems undisputed. Price influencing actions of the government must take into account farm psychology, trade practice, and ultimate customer needs, or they may create more difficulty than help.

Some relief on prices was afforded millers of corn products during late March. Ceilings were raised by 62 cents per 100 lb. at processor levels to compensate for the rise of about 40 cents per 100 lb. in the corn price. The new ceiling was set for both bulk starch and dextrine products on the basis of from 11.5 percent up to 14 percent moisture content. It was explained by OPA that the increase in allowed prices made no adjustment for any rise in costs except for the corn raw material.

FINAL PROGRAM

Institute of Food Technologists

Fifth Annual Meeting

Edgewater Beach Hotel, Chicago, Ill. • May 29, 30 and 31, 1944

May 29, 9:45 A.M.

PRESIDENT W. V. CRUESS PRESIDING

Call to order, President Cruess.
General announcements, M. L. Laing, local committee chairman.
Address: The Food Technologist's Role in the War, Major S. G. Henry, Director of New Developments Division, Office of Chief of Staff, War Department, Washington, D. C.
Address: George A. Sloan, President, Nutrition Foundation, Inc., New York, N. Y.

12:15 P.M.

LUNCHEON, M. E. PARKER PRESIDING

Address: S. S. Larmon, President, Young & Rubicam, Inc., New York, N. Y.

2:00 P.M.

MAJOR V. O. WODICKA PRESIDING

1. Food Technology Problems in Combat Areas.
   (a) European Area, Colonel Rohland A. Isker, Quartermaster Subsistence Research and Development Laboratories, Chicago, Ill.
   (b) Southwest Pacific Area, Captain W. W. Bailey, Quartermaster Subsistence Research and Development Laboratories, Chicago, Ill.
2. Special Food Problems of the Navy, Lt. Commander A. H. Harriman, Subsistence Division, Bureau of Supplies and Accounts, Navy Dept., Washington, D. C.
3. New Development in External Coatings as Corrosion Preventatives for Canned Foods. Howard Smith, National Canners Association, Washington, D. C.
4. Recent Developments in Packaging and storing of Dehydrated Foods, W. K. Neuman, F. P. Van Wazer and Roger Wilson, Continental Can Co., Chicago, Ill.

7:00 P.M.

Smoker, Chicago Section Host.

May 30, 9:30 A.M.

J. A. DUNN PRESIDING

1. How the Quality of Water as an Ingredient Affects Food Quality, G. C. Baker, Pabst Brewing Co., Peoria, Ill.
2. Correction of Defects of Water Used for Food Manufacture, H. V. Miles, Food Products Division, Infilco Inc., Chicago, Ill.
3. Deaeration of Liquid and Semi-liquid Foods. Horace L. Smith, Jr., Chain Belt Co., Milwaukee, Wis.

12:15 P.M. Luncheon

M. L. LAING PRESIDING

Address—The American Food Supply, Roy C. Newton, Swift and Co., Chicago, Ill.

PHILIP K. BATES PRESIDING

1. Basic Principles of Flavor and Odor Retention in Foods, E. C. Crocker, Arthur D. Little, Inc., Cambridge, Mass.
2. Electronics: What Is It: Its present and Potential Application in Food Processing, V. W. Sherman, Manager, Industrial Electronics Division, Federal Telephone Radio Corp., Newark, N. J.
3. How to Apply Industrial Engineering in a Food Plant, J. Biehl, Fry-Lawson & Co., Chicago, Ill.

4:15 P.M.

PRESIDENT CRUESS PRESIDING

Business session.

7:00 P.M.

PRESIDENT CRUESS PRESIDING

Banquet, Toastmaster: E. J. Davidson, Wilson & Co., Chicago, Ill.
1. Nicholas Appert Medal Award: Presentation: M. L. Laing, Chairman, Chicago Section.
   Acceptance and Response: The Keeping Qualities of Sugars and Sugar-containing Products During Storage, C. A. Browne, U. S. Department of Agriculture, Washington, D. C.
2. Address: William A. Patterson, President, United Air Lines, Chicago, Ill.

May 31, 9:00 A.M.

F. C. BLANCK PRESIDING

1. Post War Planning, R. S. McBride, consulting Engineer, Washington, D. C.
2. New Food Products in the Post War Period, Herman F. Willkie, Vice-president, Joseph E. Seagram & Sons, Inc., Louisville, Ky.
3. Extending the Use of Corn Products in Processed Foods, J. Paul Bishop, Corn Products Refining Co., Argo, Ill.
4. Possibilities of the Vegetable Proteins in Human Feeding. M. L. Anson, Continental Foods, Inc., Hoboken, N. J.

12:15 P.M. Luncheon

R. C. NEWTON PRESIDING

Address: Taking Stock and Looking Forward, W. V. Cruess, President, Institute of Food Technologists.

S. C. PRESCOTT PRESIDING

2:00 P.M.

Forum—Future Objectives and Planning of Institute of Food Technologists.
Leader: R. H. Lueck, Director of Research, American Can Co., New York, N. Y., and Chairman of I.F.T. Objective and Planning Committee.

GENERAL

Editor Reports From Middle of Pacific

FROM "somewhere in the Pacific", L. V. Burton, editor of FOOD INDUSTRIES, reports that Lever Brothers will start a quick freezing operation in New Zealand. The operation is primarily a test which is to be expanded also in Australia for the freezing of vegetables to be used by our armed forces. Two Birdseye multiple-plate freezers will be used in this test operation in what the folks down under call "snap" freezing.

WFA Reorganization Brings Early Results

RESULTS of Lee Marshall's reorganization of the Office of Distribution were seen in War Food Administration's sale of about 275,000 cases of canned pork and beans early in April. Included in the regrouping of the Office of Distribution is the centralization of responsibility of WFA's food procurement and disposition functions.

The Office of Distribution has set up an accounting system under which canned goods set aside for use of the armed services will move promptly into normal commercial distribution channels as soon as it is determined that the Army has no use for them.

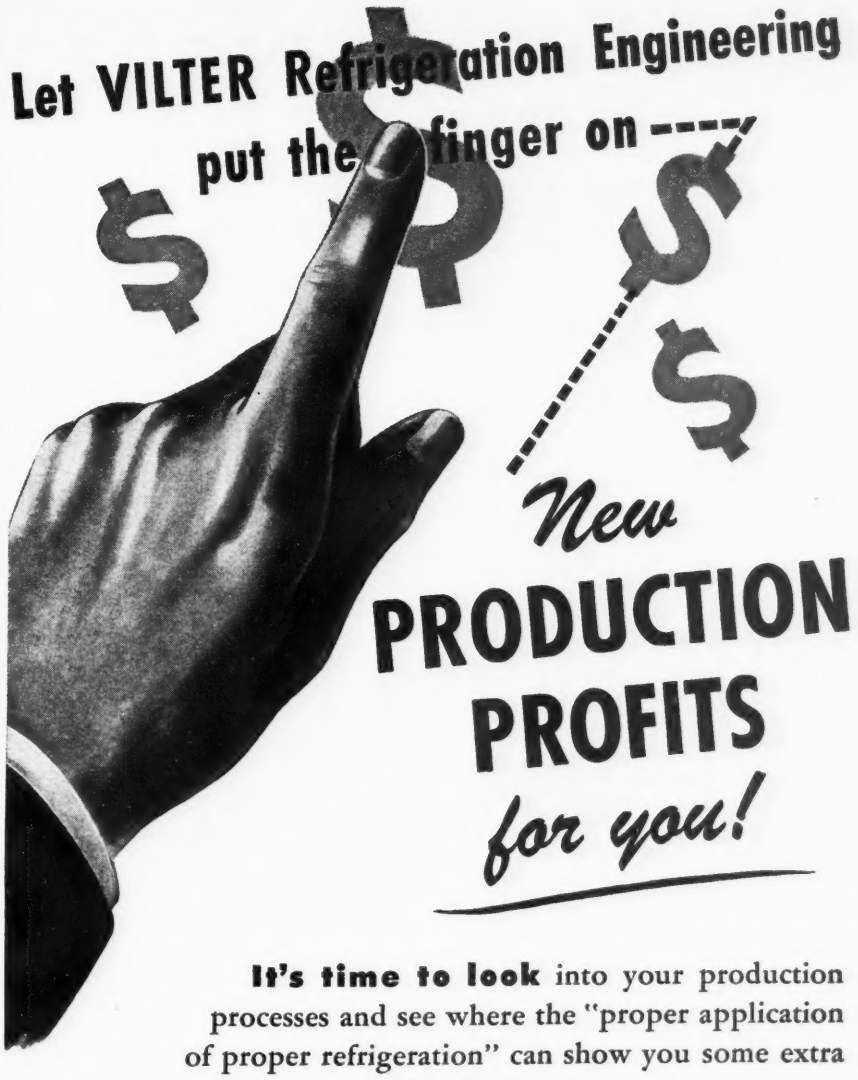
Part-Time Work Rules Fixed for Children

THE government wants about two million youths of 16 and 17 to aid in industrial jobs. The Department of Labor has declared that the agencies directly connected with the production of war goods have endorsed a combined work and school week of not more than 48 hours and a combined work and school day of not more than nine hours for 16- and 17-year-olds.

More "A" Awards

FOR outstanding performance in food production, six more food processing plants in four states have earned the WFA achievement "A" award. These bring the number of plants to receive the award to 88.

WFA's Office of Distribution reports that award presentation ceremonies will be held in the near future for these six plants: Edgar F. Hurff Co., Swedesboro, N. J.; P. J. Ritter Co., Bridgton, N. J.; David Harum Canning Co., Homer, N. Y.; Gerber Products Co., Freemont, Mich.; Reid Murdoch & Co., Ellsworth, Mich.; and Bireley's Division of General Foods Corp., Hollywood, Calif.



It's time to look into your production processes and see where the "proper application of proper refrigeration" can show you some extra profits — now and in the future.

Vilter engineers, by their long experience and thorough knowledge of process refrigeration, are finding "hidden" sources of extra profit in many plants. These hidden profits may take the form of improved production speed, reduced manpower, more efficient and complete use of present equipment, smoother operation — even new products and improvement of present products.

This is a proven service in refrigeration engineering that Vilter is able to offer you *now.* It's a service that should help you improve your present market standing and prepare for future competition in the post-war period. It may help you to more economical purchase of replacement equipment today. In either event, you will benefit by calling Vilter now.

VILTER MANUFACTURING COMPANY
2115 South First Street — Milwaukee 7, Wisconsin

Attention!

LOCKER PLANTS AND PROCESSORS

for Speed and Safety on the Production Line..

"SAFETY-PACK"

FROZEN and DEHYDRATED FOOD BAGS

Completely Heat-Sealed Cellophane
FROZEN FOOD BAGS
Single Wall or Duplex—Flat or Square
Completely Heat-Sealed Cellophane
DEHYDRATED FOOD BAGS
Single Wall or Duplex—Flat or Square
SELF-OPENING STYLE BAGS
Box-Like Protection in Bag 'N' Bag Packages. Single Wall or Duplex
LAMINO (Laminated)
DEHYDRATED FOOD BAGS
Flat Style Only

ALL bags are custom-designed to meet your own specifications for moisture-vaporproof qualities and shelf appeal. Printing one to four colors when desired.

CONTINENTAL BAG SPECIALTIES CORP.
WAR-TESTED PACKAGING

HUDSON RIVER AT 27 ST. NEW YORK CITY 1, N.Y.
2736 EAST 12 STREET LOS ANGELES, CALIF.

BUY MORE WAR BONDS NOW!

INDICATORS

Production

Tomato pack for 1943 is reported as 25,026,561 cases (all sizes) by National Canners Association. On the basis of 24 No. 2 cans per case, this is equal to 29,210,840 cases.

Flour output in March was about the same as in February, with a slight increase of 59,000 sacks, according to figures compiled by *The Northwestern Miller*. March production was 14,151,428 sacks, representing 73 percent of the total U. S. output. A year ago, with 64 percent of the output represented, the figure was 14,045,087 sacks.

Butter, creamery, production for February was 13 percent lower than in the previous month and 9 percent below the 1933-42 February average, being 105,660,000 lb.

Tomato catchup pack in 1943 amounted to 9,382,175 cases, National Canners Association reports. The 1942 pack was 11,770,819 cases.

Cheese, American, output totaled 45,850,000 lb., 43 percent higher than the 1933-42 average for the month.

Cheese, Swiss, manufactured in February amounted to 2,165,000 lb., about the same as in February, 1943, and higher than the 1,980,000 lb. figure for January this year.

Cheese, cream and Neufchatel, output in February totaled 5,225,000 lb., down 20.8 percent from the month before but up 5.6 percent from the February, 1943, figure.

Coffee roasted in February amounted to 1,329,678 bags, slightly more than in January.

Oleomargarine production is soaring to new heights under the stimulus of wartime demands and shortages of butter. Production set new records last year, increasing about 50 percent over the previous year's output, and a further increase of about 150,000,000 lb. is expected this year. Margerine manufacturers used 500,000,000 lb. of domestic fats and oils—principally cottonseed oil—last year.

Evaporated milk, unskimmed (case goods), in February is estimated at 211,250,000 lb., compared with 194,500,000 lb. in January and 210,315,000 lb. in February last year. The February output was, except for 1942, the largest for the month and was 15 percent over the 5-year (1938-42) February average.

Condensed milk (case goods) output in February was 8,460,000 lb., the same as a year ago and 9 percent higher than in January this year. The figure is 102 percent over the 5-year February average.

Raw Materials

Eggs, dried, produced in February totaled 26,206,000 lb. compared with 20,878,000 lb. in February last year. The production consisted of 25,462,000 lb. of whole eggs, 231,000 lb. of albumen and 513,000 lb. of yolk. The dried egg output for the first two months of the year is 45 percent above that for the same period last year.

Egg, frozen, produced in February probably set a record for that month, totaling 38,480,000 lb. For the first two months of the year the production is up 136 percent over last year. Storage holdings of frozen eggs on March 1 totaled 99,437,000 lb., compared with 56,095,000 lb. a year ago.

Fish and shellfish production in 1944 probably will reach, and may exceed, 4,000,000,000 lb., according to a forecast by Coordinator of Fisheries Ickes. The pack of canned fish is expected to increase by about 10 percent over the total pack for last year.

Coffee stocks in the United States at the end of February were 3,723,586 bags, according to the Inter-American Coffee Board. This figure is up slightly from a month earlier.

Eggs laid in February reached an all-time high for the month, totaling 5,346,000,000. This figure is 16 percent above that for the same month of 1943 and 79 percent greater than the 1933-42 average.

Rice stocks held at mills at the end of February amounted to 2,463,210 units, a decline of 221,624 units from holdings a

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:
Please change my address on "Food Industries"

From .....

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To .....

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Signed .....

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Condensed milk (case goods) output in February was 8,460,000 lb., the same as a year ago and 9 percent higher than in January this year. The figure is 102 percent over the 5-year February average.

Raw Materials

Eggs, dried, produced in February totaled 26,206,000 lb. compared with 20,878,000 lb. in February last year. The production consisted of 25,462,000 lb. of whole eggs, 231,000 lb. of albumen and 513,000 lb. of yolk. The dried egg output for the first two months of the year is 45 percent above that for the same period last year.

Egg, frozen, produced in February probably set a record for that month, totaling 38,480,000 lb. For the first two months of the year the production is up 136 percent over last year. Storage holdings of frozen eggs on March 1 totaled 99,437,000 lb., compared with 56,095,000 lb. a year ago.

Fish and shellfish production in 1944 probably will reach, and may exceed, 4,000,000,000 lb., according to a forecast by Coordinator of Fisheries Ickes. The pack of canned fish is expected to increase by about 10 percent over the total pack for last year.

Coffee stocks in the United States at the end of February were 3,723,586 bags, according to the Inter-American Coffee Board. This figure is up slightly from a month earlier.

Eggs laid in February reached an all-time high for the month, totaling 5,346,000,000. This figure is 16 percent above that for the same month of 1943 and 79 percent greater than the 1933-42 average.

Rice stocks held at mills at the end of February amounted to 2,463,210 units, a decline of 221,624 units from holdings a

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:
Please change my address on "Food Industries"

From .....

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To .....

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Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded April (thousands)	Total Awarded 1944 (thousands)
Bakery	$45	.....	$80
Beverages	125	.....	.....
Canning and Preserving	115	.....	40
Cold Storage	495	$120	526
Confectionery	.....	50	50
Grain Mill Products	369	250	250
Ice, Manufactured	.....	.....	40
Meats and Meat Products	.....	40	220
Milk Products	550	100	773
Miscellaneous	125	90	410
	$1,824	$650	$2,389

year earlier, Rice Millers' Association reports.

Raisins, dried, which will be carried over from the 1943 crop total only an estimated 19,000 tons, substantially less than normal, according to WFA. The 1942 carryover was 35,000 tons.

Peanut acreage this year will be about 10 percent lower than the record 1943 plantings, a report by the BAE indicates.

Fats and oils production from domestic materials will be less in 1944-45 than a year earlier, unless growing conditions for oilseed crops are materially better than average and yields per acre unusually high, the Department of Agriculture reports.

Pilchard fisheries produced 486,816 tons of fish in the season just ended, compared with 501,114 tons in the previous season. The drop resulted from low production in southern California. All other sections showed increases.

Sugar stocks were 600,000 tons smaller at the end of February than they were a year ago, the total being 1,403,358 tons.

Indexes

Business activity index of *Business Week* reached 240.1 on April 15, compared to 239.3 a month earlier and 233.4 a year ago.

Cost of living index of the National Industrial Conference Board remained at 103.4 in March, the same as in February. This compares with 103.9 in January and 103.0 in March, 1943. The food index stood at 109.2 in March, down 0.4 percent from the February figure.

Commodity price index (weekly) of the *Journal of Commerce* stood at 107.9 on April 8, compared with an average figure of 107.6 for the month of March. The index for foods was at 105.7 on April 8 and the average March figure was 104.5.

Wholesale food price index of Dun & Bradstreet was $4.03 for the week ended April 4.

Wholesale commodity price index for foods, compiled by Irving Fisher, was 120.8 on April 14, compared to 122.7 a year earlier.

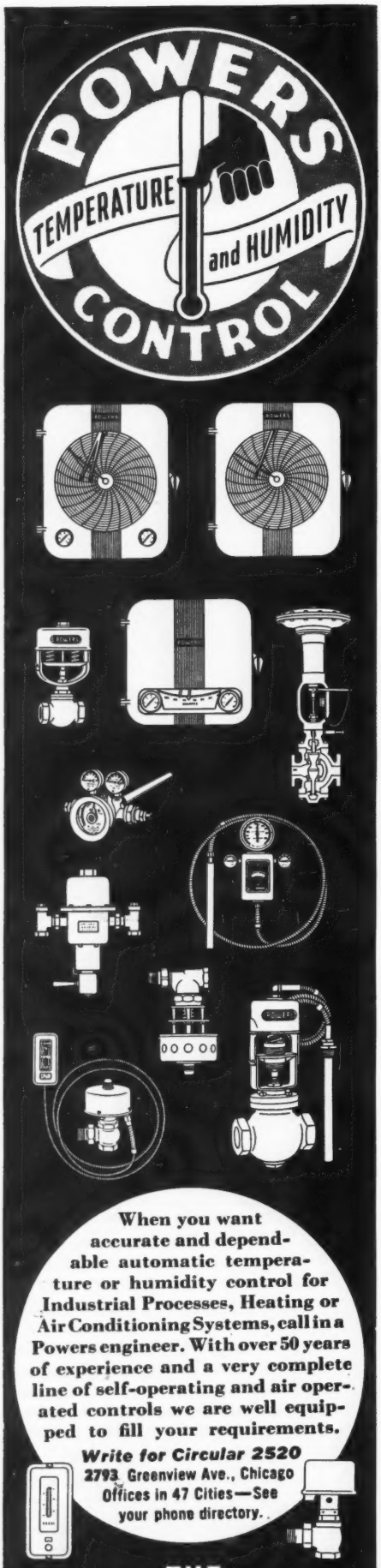
The stability of a disinfectant is of two-fold importance. Obviously it is poor economy to buy a disinfectant which may lose its strength on standing. But even more important than that . . . an unstable disinfectant vastly complicates the problem of getting dependable results.

With Diversol, however, it is a simple matter to prepare solutions of a definite germicidal strength. That's because Diversol comes in stable crystals that lock-in the quick-acting, available chlorine until dissolved in water. Then . . . and then only . . . does Diversol go into action. Just add the required amount of water and rinse or spray the previously cleaned equipment.

Diversol Chlorine Test Set—Certain health department regulations require that disinfecting solutions be tested for available chlorine. With Diversol, because of its "locked in" stability, it is easy to prepare solutions of any desired germicidal strength. With the Diversol Chlorine Test Set, a convenient method of checking solution strength is provided. Ask your Diversey D-Man for further details.

Not only is Diversol quick-acting, but its unusual penetrating power helps assure contact with bacteria. At the same time Diversol solutions, when used as directed, are harmless to metal surfaces commonly used in the food plant. Easy to use . . . dissolves quickly and completely . . . softens hard water . . . leaves no film or scale.

To help control food-spoiling bacteria, mold and yeast, more and more food producers are turning to Diversol. Order a trial drum today . . . return for full credit if not completely satisfied. THE DIVERSEY CORPORATION, 53 W. Jackson Blvd., Chicago 4, Ill.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OPA Price Regulations

Ration Points—Ration points allotted to industrial users for frozen foods will be charged to excess inventory in cases where those foods are now point free. The action, contained in Amendment 22 to RRO 13, effective April 6, is necessary since the industrial user holding these points would otherwise be able to get more than his share of other rationed products.

Bakery Products—RMPR 319, effective April 4, incorporates the original regulation into one document and makes two changes: (1) Producers must now report not only their new maximum prices, which are recalculated twice a year, but also the new weight of each commodity being priced and the weights and maximum prices of these commodities during the base period. (2) Bakers who sell direct to ultimate consumers, and who are required to indicate their ceiling prices on all packaged items, may now do so by furnishing these consumers with the names and maximum prices of commodities being offered for sale. The list must be renewed every 14 days.

Oleomargarine—Increases in the maximum price of some brands of oleomargarine are permitted by Amendment 23 to Supplementary Regulation 15, effective April 8. These increases may be granted where the maximum price is below the general price level prevailing for similar products, where the processor is unable to maintain his production under the present ceiling or where the loss of his production would result in consumers having to pay higher prices for the most nearly similar substitute product available.

Industrial Rations—The industrial factors for rationed processed fruits and vegetables and for meat-fats for the allotment period, April 1 to June 30, are embodied in Amendment 7 to Second Revised Supplement 1 to RRO 13 and Amendment 20 to Revised Supplement 1 to RO 16. An industrial user is one who uses rationed foods in the production of an item which is not rationed. The new factors indicate that the industrial user can obtain more canned vegetables, less canned fruit, more meats and more of some fats than in previous periods.

Sardines—Processors' maximum prices for Maine sardines were reduced by 4 cents a case and were changed from f.o.b. Portland base to f.o.b. the railroad shipping base nearest the cannery by Amendment 4 to MPR 184. The new price includes an allowance of 3 cents per case to cover transportation costs from the canneries to the nearest railhead.

Black Pepper—As a result of a cost study of the major portion of whole black pepper stocks held in the U. S., the OPA is retaining the maximum prices set by Revised Price Schedule 52 and its amendment. This statement was issued to clear up any possible misunderstanding by holders of pepper.

Dates—Maximum prices, substantially above 1942 levels, for pre-wholesale sales of pitted and macerated dates and date products of the 1943 and later crops are set by MPR 521, effective March 18. The action is expected to relieve industrial users who have been paying higher prices for fresh dates and then have had to pay to have the dates pitted and macerated. Maximum prices for all dates will be established later.

Fruit and Berry Wines—Until such time as OPA can issue a regulation for a new flat price schedule for the entire 1943 wine production, processors of fruit and berry wines and grape wines other than California grape wines, must determine their maximum prices for wines from the 1943 fruit crop on the same basis they used for the 1942 crop. The regulation, contained in Amendment 112 to Revised Supplementary Regulation 14, permits the processor to add the new Federal excise tax to his ceilings without taking mark-ups on them.

Exporting—General RO 17, effective March 31, consolidates the regulations covering the export of rationed foods which were previously contained in RO 3 (sugar), RO 13 (processed foods) and RO 16 (meats and fats). The new regulation provides a uniform system for acquiring all rationed foods for export as well as for replacing foods which dealers export.

Maple Sugar and Sirup—Producers of maple sugar and maple sirup are now limited to one price in selling to all purchasers—19 cents per pound. Formerly they could sell to purchasers other than packers at 22.5 cents per pound while the price to packers was set at 19 cents. As a result, the packers were able to purchase only about half their normal supply in 1943.

Evaporated Milk—Amendment 29 to MPR 289, effective March 25, established ceiling prices for a nonexistent 13-oz. domestic can of evaporated milk. The amendment was requested by government procurement agencies in order to facilitate pricing of the 13-oz. export container, which is preferred for shipping reasons. The pricing is in line with the present pricing of the 14½-oz. can.

Pork Cuts—Primary distributors must now give ration points for four pork cuts that are used principally in making sausage and canned meats, according to Amendment 117 to RO 16, effective March 23. The cuts, fat backs, fat back pork, clear plates and jowls, are an important part of the meat supply and the consumer is ordinarily required to give points for finished products made from them.

Condensed Milk—New dollars-and-cents wholesale ceiling prices for bulk condensed milk products and for canned sweetened condensed milk are established by Amendment 30 to MPR 289, issued April 3, for all wholesale levels of distribution. The prices are lower in some instances and higher in others, but on a per-pound bulk basis the difference is only a fraction of a

cent and will not be reflected in prices to consumers.

Fruit Butter—Manufacturers who use unsweetened frozen fruit to make fruit butter may obtain sugar for the purpose at the rate of 0.32 lb. for each pound of the finished fruit butter produced, according to Amendment 8 to Revised RO 3. No limit is set on the total amount of sugar allowed. This is the same rate at which sugar is provided for making fruit butter from fresh and dried fruits.

Amendment 5 to the same order provides sugar for home canners at the same rate as last year—20 lb. per person.

WPB Orders

Fluid-food Trucks—Limitation order L-1-j is amended to eliminate reference to information that should be supplied when filing WPB Form 1319 for authorization to sell, transfer or convert fluid-food trucks, trailers or tank tractors. WPB Form 1319 is now to be filed in quadruplicate and is to contain information called for by current instructions which will be available with the form.

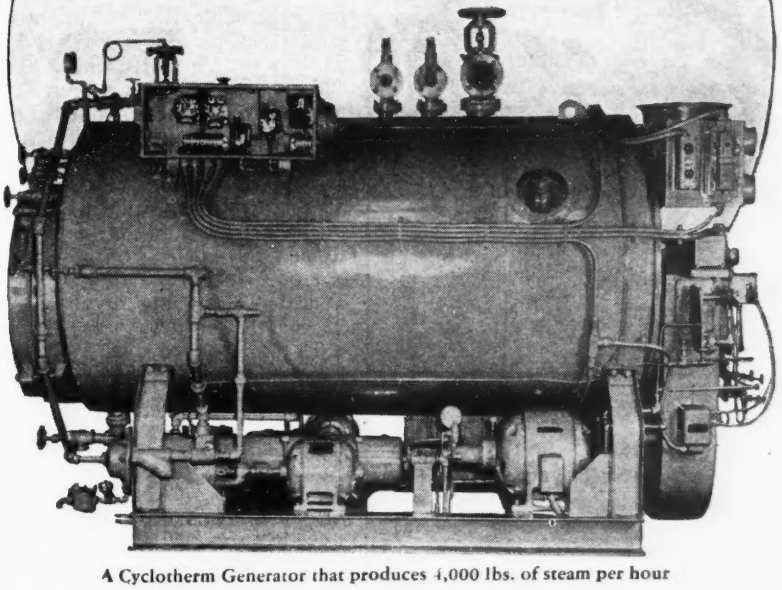
Tinplate—Inventory restrictions on acceptance of tinplate for the manufacture of cans in the states of Washington, Oregon, California and Utah have been relaxed to permit can manufacturers to accept deliveries of material that will be needed for use within 90 days of acceptance. The action is effective until September 30 and is contained in CMP Reg. 2, Inventory Direction 15, effective March 30.

Paper Liners—Directives have been issued to specific mills to assure regular deliveries of newsboard to manufacturers of paper liners used in closures for glass containers. This action was taken by WPB to provide sufficient supplies of newsboard to meet requirements for the more than 9,000,000,000 glass containers that are now sealed with paper liners.

Processing Machinery—According to Interpretation 2 to L-292, any manufacturer may apply, within classes of materials, various percentages of each type of material used. If, for example, a manufacturer of food processing machinery is permitted to consume 110 percent of the average annual amount of steel and copper, he is not permitted to apply part or all of his steel quota to his copper allocation and thereby exceed his copper quota of 110 percent. He may consume, however, such amounts of carbon steel and other quantities of alloy steel as he chooses provided the total quantity of all types of steel does not exceed his quota percentage allocation.

Glass Containers—Packers of mustard may continue to use the type of glass container now in use until June 20. This amendment to Schedule C of L-103 extends the cut-off date for such use from March 20. By June 20 standard containers will be available and must be used by mustard packers after that date.

DOLLAR EFFICIENCY—
work done per dollar spent measures the value of steam generation



A Cyclotherm Generator that produces 4,000 lbs. of steam per hour

Hundreds of Cyclotherm Steam Generators in a wide range of horsepower have proved they can "take it" and deliver under all kinds of wartime conditions.

The Cyclotherm steam generator shown here, built for the United States Navy, is ruggedly constructed for heavy duty purposes. This unit is fired with Bunker C oil and produces 4000 pounds of steam per hour.

All Cyclotherms are fully automatic, completely self-contained and adaptable to processing, power or heat. The wide use of these generators has proved their unusual steam producing capacity per unit of fuel consumed. Cyclotherm's exclusive principles of combustion and design insure high efficiency at low operating costs.

Cyclotherms may be operated for years with a minimum of attention for they are designed and built to deliver efficient, trouble-free automatic service under exacting conditions.

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WFA ORDERS

Fats and Oils—FDO 42, effective March 17, broadens the exempt use of fats and oils for food and beverage container coatings to include the exteriors as well as the interiors. The order also eases restrictions on other industrial uses of fats and oils and makes several minor technical changes in the order.

Milk Sugar—Approval by the Director of Food Distribution for the use of milk sugar for any purpose is required by FDO 95, effective April 1. Under the order, authorization to accept delivery of and to use milk sugar must be requested on forms supplied by WFA's Office of Distribution. When approval is granted the supplier will be notified of the quantity he may supply. This action is taken because milk sugar production this year will not be sufficient to meet the requirements of all users.

Poultry—The poultry freeze order, FDO 91, was terminated April 3. Under the order the Quartermaster Corps obtained about 88,000,000 lb. of chicken and fowl.

Butter—Quality and packaging requirements for set-aside butter are revised in Amendment 2 to FDO 2, effective April 1. All butter for government agencies must be salted, U. S. 90-score or better and must be packed as bulk in domestic packages unless other specified arrangements have been made with authorized receivers. The order requires each producer of more than 12,000 lb. in any calendar month from April 1, 1943, to March 31, 1944, to set-aside during April, 1944, and each subsequent month a quantity equal to a percentage of his total production. Producers who reach 12,000 lb. monthly after March 31 must set-aside the applicable percentage in each month thereafter.

Corn—Movement of corn from farms or elevators in 125 counties in Minnesota, Iowa, Nebraska, Illinois and Indiana is restricted to sales to CCC for 60 days after April 25 unless vital requirements are obtained before the end of that period. Feed mixers are limited to the average used during the corresponding period in 1942-43. Free shelling and transportation are offered for corn sold to the government.

Dry Beans—The set-aside percentage on six classes of dry beans is reduced from 100 to 25 percent of deliveries into civilian channels by an amendment to FDO 45. The amendment also releases previously classified country shippers whose deliveries in all designated classes do not now exceed 20,000 lb. per month and who meet certain specified requirements.

Vitamins—From a total allocation of slightly more than 2,500,000 lb. of synthetic vitamins, civilians will receive about 1,250,000 lb., or a little over 53 percent. More than half of the civilian allocation will be used to enrich food, chiefly bread.

CAPITAL VIEWS

DEFERRED AS 4-F—A vast majority of the boys in 4-F are just as employable for a majority of jobs in the food industries as are the boys put into uniform. These young men must be made to see that they have a chance to serve the public need by taking employment in an essential food factory. Local boards will be glad to know that those whom they must reject can take such necessary positions. It is not out of the way for employment managers of the food industries to take aggressive steps to get as many as possible of these young men. Incidentally, it would be well to show these men how important is the service they can render if they do a share in the feeding of America.

OPA COMMENDED—A great many folks have assumed that Congress would take its present opportunity in extending the life of OPA to do very drastic things in the curtailment of that unpopular agency. Actually, the hearings have proved more of a love feast and compliment for OPA than a chance to tear down that price-control and rationing body. Even the most conservative groups, when they stop to think seriously about the matter, realize that despite its mistakes this agency has done vastly more good than harm. Chester Bowles has sold his Office to Congress very effectively. Most observers of Washington think that it was the smarest politics of all merely to take OPA out of politics.

There seemed to be no doubt during April that the life of OPA will be extended with relatively little restriction. Congress will want to keep a little closer in touch with policy making, but it generally approves most of the actual operations despite the way they pinch individuals and companies.

BETTER LOADING—Damage and loss in transit of scarce commodities demands closer attention to both packaging and loading precautions. Washington urges that business executives again ask for a careful review, down to the practices of the lowliest laborer, in order to save packaging materials, to save scarce foods, to minimize waste of freight-handling space and to insure maximum delivery in good order.

BEVERAGE HOLIDAY It looks as though there would be no holiday from industrial alcohol making for any of the beverage industry now so engaged. However, Washington points out that many wineries can use waste fruit and vegetable materials, and thus in some measure relieve the shortage of alcohol for beverage use, without depleting either scarce feed or important food materials. Such firms need not be deterred by the high cost of the resulting alcohol, if they take suitable steps to secure appropriate price ceilings for their products.

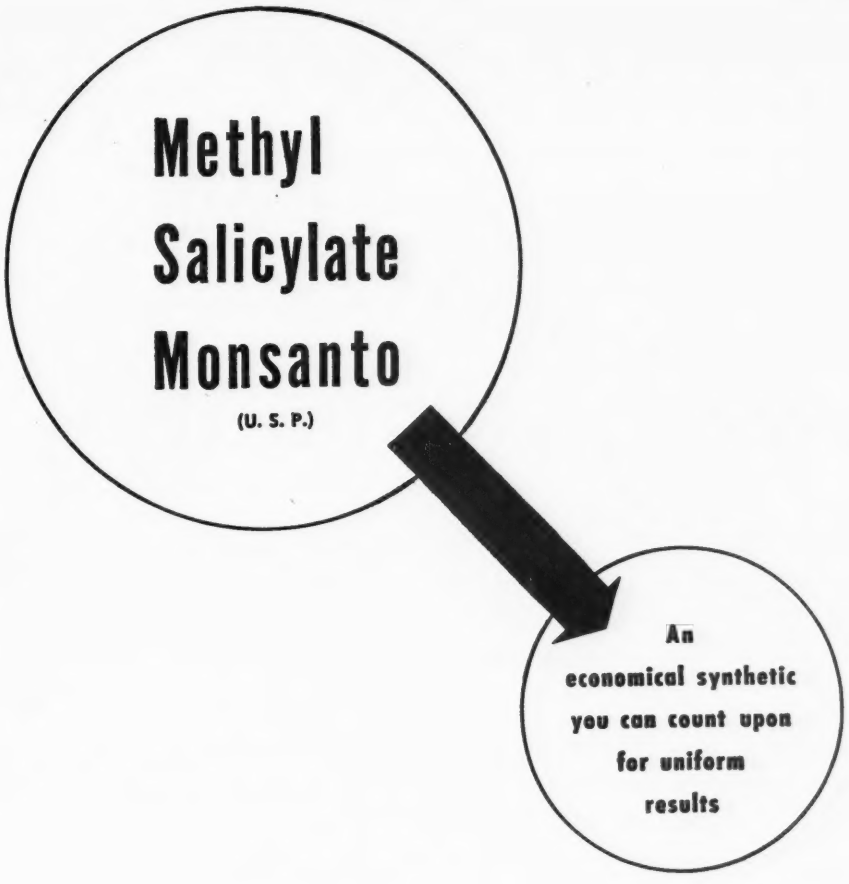
"SIMPLIFIED PRACTICE"—Again Washington is stirred by demands for grade labeling of foods. This effort to "overhaul our way of life" is being attacked by Rep. Charles A. Halleck. He points out the threat to all nationally advertised goods in the unwarranted attempts of certain reformers whose effort he calls "this insidious campaign to destroy the benefits of our system of brand names and trade marks." But Rep. Halleck also emphasizes that there is no objection to sound industry-planned simplified practice, which eliminates unnecessary types and varieties of goods and produces merchandising efficiency.

FUEL IS SCARCE—Fuel users in all parts of the country must plan to use less fuel during the next twelve months, regardless of the kind of fuel they employ. That unpleasant prospect is inescapable when Washington goes so far as to virtually ration householders using coal for home heating. It will no longer serve to be forehanded and build a big stockpile, because the quantity which can be delivered now is restricted. And future deliveries are likely to be severely curtailed. Every food technologist will have to turn fuel expert before the season is over, or some processing will suffer.

NEW TAX LABELS—Food manufacturers and processors can help their distributors materially by providing exact information as to the effect of the new tax law on required price labels. OPA has set up very exact regulations as to the way a price may be stated to ultimate consumers if it is raised above former ceiling prices because of new Federal taxes. Few dealers will know how to do this accurately. Each manufacturer whose goods are so affected should supply exact data, and information on how to use it.

THREE-QUARTERS DONE—"Approximately 75 percent of all family flour now used by the general public is enriched." Thus, without mandatory requirements, the industry has taken up flour enrichment under the pressure of competitive conditions. As more abundant vitamin supply is available, and price changes respond to abundance, it can be expected that only a relatively small percentage of all flour will go to the public without the desirable vitamin and mineral content. Regimentation is not needed to secure progress; but there are many in Washington who do not yet accept that conclusion despite this proof.

DRIED MILK BOOSTED—Anticipating a decline in government and export use of dried milk, an aggressive plan of promotion is being aided by the Bureau of Dairy Industry. This and other government agencies are supporting the industry in an effort to persuade Mrs. Housewife that dried milk has an important place in home cooking. The industry is taking advantage of the new Congressional act to talk about "non-fat dry milk solids"; but it is interesting to note that government officials still use the terms "skim milk powder" and "dried skim milk" as they undertake to boost the use of this valuable food ingredient.



You can be sure of giving your products that "just right" wintergreen flavor *every time* when you depend upon Methyl Salicylate Monsanto.

Methyl Salicylate Monsanto—synthetic oil of wintergreen—is uniform and high in purity. A given quantity always imparts the same flavoring strength, simplifying your formulations. Methyl Salicylate Monsanto contains no harsh ingredients.

Monsanto makes most of the raw materials for Methyl Salicylate and, therefore, has control of their quality. The flavoring itself is made under the highest manufacturing standards and under strictest laboratory control. This is *your* assurance of quality and satisfaction.

Unless you are a regular Monsanto customer, we may not be able to supply you with Methyl Salicylate in commercial quantities. We shall be pleased, however, to send you technical details or samples for your experimentation. Please address your request to: MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

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"THAT'S THE LAST TIME I BUY *that* PRODUCT!"

ONCE is enough! When a customer finds insect life in a food product, she wastes no time in getting rid of the package. Usually it marks the end of her faith in that brand.

Don't Let "Hidden Failure" Hurt the Sales or Reputation of Your Products

By "hidden failure", we mean the failure to make absolutely SURE that NO insect life is present in your product *before* packaging. In the cleanest plant, a small amount of insect life can get into a product by way of the raw materials. This infestation is usually in the form of eggs, so small they defy detection. Unless immediately destroyed, they are likely to develop within the finished product and to undo the efforts of the manufacturer to insure high food standards.

More and more food processors have been finding the solution to this problem during the past four years. In actual plant operation, the mechanical "ENTOLETER" has proved to be a most economical and dependable method of controlling infestation.

"ENTOLETER" Control Safeguards Your Processed Foods and Helps to Maintain a Clean Plant

The "ENTOLETER" is the new, positive method of insect control which DESTROYS ALL FORMS OF INSECT LIFE in flour, meal, mixes, cereals, powdered soups and similar free-flowing, dry materials. It is wholly mechanical; uses no heat, gas or chemicals, and does not change moisture content of "ENTOLETED" products. Approximately 3 ft. high and 2 ft. in diameter, it is easy to install; simple to operate and maintain.

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The "ENTOLETER" shown above handles 15,000 lbs. hourly. Other sizes are available with capacities of 2,000, 5,000 or 10,000 lbs. per hr.

ENTOLETER

INFESTATION DESTROYER

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CONTINUOUS DESTRUCTION OF ALL INSECT LIFE

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INDUSTRY

American Sugar Refining Co. has contracted to purchase W. J. McCahan Sugar Refining & Molasses Co., Philadelphia, Pa., one of the oldest sugar refineries in the country. The transaction is subject to approval of the McCahan stockholders.

Borden Co., New York, has bought Shark Fisheries, Inc., and Shark Industries, Inc., both in Hialeah, Fla. With the purchase of the new properties, Borden's fishing operations, which now run from British Columbia to lower California on the West Coast, will be extended to the Gulf and the East Coast of Florida.

Bozeman Canning Co., Mt. Vernon, Wash., has acquired a building at Buhl, Idaho, and plans to establish a canning plant there.

J. B. Carr Biscuit Co. plans to enlarge its branch at Greenwood, S. C., to provide more efficient production and warehouse facilities. J. B. Carr manufactures biscuits for Army Rations C and K.

Castleburry Food Co.'s sauce plant and warehouse in Augusta, Ga., recently was destroyed by fire with a loss estimated at $75,000.

Charms Candy Co. has purchased a plant at Asbury Park, N. J., to package hard candy for overseas shipment.

Comstock Canning Corp., Newark, N. J., has sold its East Pembroke, N. Y., plant. The plant will operate under the new name of East Pembroke Canning Corp.

Di Giorgio Fruit Corp. has purchased Kern County Dehydrating Co., Bakersfield, Calif. Harry Amenta, former chief of the dehydrated foods section of WPB, continues as president. The plant will dehydrate potatoes, onions and raisins.

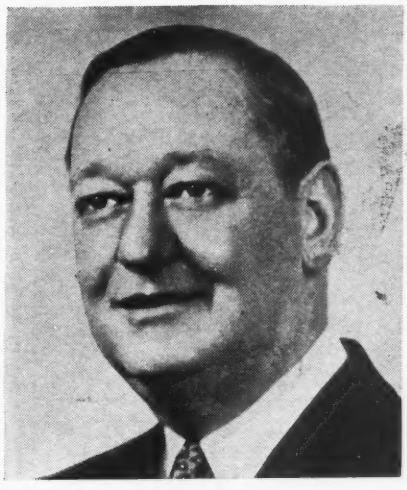
Illinois Nut Products Co., Chicago, candy manufacturer, has been dissolved and a new company has been formed called McGarry Nut Products, Ltd. There have been no changes in personnel.

North Carolina Seafood and Packing Co. has been organized in Morehead City, N. C., by N. LeRoy Cannon.

Pet Dairy Products Co. has acquired Sanitary Dairy and Chapman's Dairy in Greenville, N. C.

Pineapple Producers Cooperative Association has been reorganized into two new divisions—Pineapple Growers Association of Hawaii and Pineapple Research Institute of Hawaii. The growers association will function as a progressive trade association and the research institute will carry on scientific agricultural research. Elvon Musick, former president of PPCA, will continue as president of both organizations.

A. J. DREUX

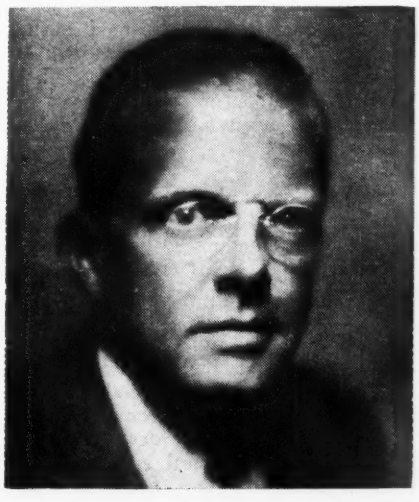


E. E. STEWART

Formerly a vice-president of Rieck-McJunkin Dairy Co., Pittsburgh, Pa., A. J. Dreux has been appointed president of the company, succeeding E. E. Stewart, who has been transferred to Chicago as president of Hydrox Corp. Both companies are divisions of National Dairy Products Corp., New York. In addition to his duties as president of Hydrox, Mr. Stewart has been elected a vice-president of the parent company and will act in a coordinating capacity to National Dairy's milk and cream divisions in the Midwest.

R. D. Pringle, Ogden, Utah, frozen food packer, is constructing a second frozen food plant adjacent to Pacific Fruit Express Co.'s ice plant at Modesto, Calif.

Ralston-Purina Co., St. Louis, Mo., has begun the installation of soybean processing equipment in Kelley Mill Co., Kansas City. Recently Kelley Mill was purchased by the company.



W. K. DICK

National Sugar Refining Co., New York, has elected W. K. Dick chairman of the board of directors, succeeding Charles D. Bruyn, who has retired after nearly 47 years of service. Before becoming board chairman, Mr. Dick was chairman of the executive committee and has been a National Sugar director since 1923.

Safeway Stores, Inc., Oakland, Calif., has purchased South San Francisco Packing and Provision Co., and is also negotiating the acquisition of Acme Packing Co.'s plant in Seattle, Wash., and its main feeding plant in Klamath Falls, Ore.

Utah Food Products Cooperative has begun to dehydrate potatoes for the Army in its new plant. The dehydration plant is the first in Utah and has a production capacity estimated at 70,000 lb.

PERSONNEL

Alfred A. Bacher has become director of research for Milbrew Co., Milwaukee, Wis. Prior to his appointment, he had been with Narragansett Brewing Co., Cranston, R. I.

L. L. Bronson, of Armour & Co., Chicago, and T. C. Tait, Swift & Co., Chicago, have been named president and vice-president, respectively, of National Meat Canners' Association, for the coming year.

William J. Cecil, director of California's Department of Agriculture, has resigned to become general manager of California Grape Growers and Shippers Association, Fresno, Calif.

Joseph B. Donnelly has been appointed president of Cresta Blanca Wine Co., Inc., Livermore, Calif., one of the oldest wineries in California. Prior to his appoint-

The

HAM BEETLE

He's usually, carnivorous, devouring other insects—but he also enjoys a meal of meats or cheese.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well planned fumigation program.

We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington, Delaware.

DU PONT
REG. U. S. PAT. OFF.
CYANEGG
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AN ECONOMICAL SOURCE
OF HCN FUMIGATING GAS

ment, he had been vice-president in charge of operations.

Louis Ehrenfeld, technical consultant for Pabst Brewing Co., Milwaukee, Wis., has resigned that position.

Charles G. Ferrari, director of research, General Mills, Inc., is now with Standard Brands, Inc.

H. E. Gray has been elected president of Canners' League of California, and Preston McKinney has been reappointed executive vice-president.

E. H. Harvey, formerly director of research of Anheuser-Busch, Inc., St. Louis, Mo., is now director of research for General Printing Ink Co., New York.

John T. McCarthy, Jersey Bread Co., Toledo, Ohio, has been elected president, and Ralph D. Ward, Drake Bakeries, Inc., Brooklyn, N. Y., has been named chairman of the board of American Bakers Association.

E. A. Meyer, formerly vice-president of G. H. Musselman Co., Biglerville, Pa., has been named associate chief of War Food Administration's fruit and vegetable branch. Previous to his appointment with WFA, he was assistant director of WPB's food division.

Harold Oldroyd has been elected secretary and a member of the board of directors of Blue Moon Foods, Inc., Thorp, Wis.

Stanley DeJ. Osborne, vice-president and treasurer of the Fisheries Division, Atlantic Coast Fisheries Co., Boston, Mass., has taken an executive position with Eastern Airlines, New York.

Earl F. Paxson has been made general manager of Savory foods department in the Ottumwa, Iowa, plant of John Morrell & Co., succeeding the late T. W. Bailey. He was formerly Savory foods manager at the Morrell company's Sioux Falls, S. D., branch.

James Rockwell, plant superintendent of Hawthorne-Melody Farms, Inc., Chicago, is now with Hunding Dairy Co., in a similar capacity. He is also president of Chicago Dairy Technology Society.

M. A. Rust, who since 1935 has been a member of the laboratory and research staff of Colorado Milling and Elevator Co., Denver, Colo., has been elected director of research bakery development at its newly enlarged cereal laboratory and research bakery.

Nate L. Schmid has been appointed vice-president and assistant general manager of Woolson Spice Co., Toledo, Ohio. He has been associated with Woolson for 40 years.

G. W. Shadwick has been made chief of Beatrice Creamery Co.'s general control and quality laboratory.

PHILIP K. WRIGLEY

Philip K. Wrigley has resigned his position as president of Wm. Wrigley, Jr., Co., manufacturer of chewing gum. He is succeeded by James C. Cox, first vice-president and treasurer. Mr. Wrigley will continue as a member of the board of directors.

William H. Vogler has been elected a vice-president of New England Confectionary Co., Cambridge, Mass. He is also treasurer and a director of the organization.

Ernest Webster, superintendent of British Columbia Sugar Refining Co., Ltd., Vancouver, B. C., has retired after completing almost 50 years of service. He is succeeded by H. W. Perry.

DEATHS

William J. Barritt, Sr., 65, chairman of the board of Borden's Poinsetta Dairy, recently, in St. Petersburg, Fla.

Charles W. Buck, 86, retired founder and former executive of Pet Milk Co., St. Louis, Mo., recently, in Beverly Hills, Calif.

Arthur M. Doell, 65, head of Swift & Co.'s egg division, April 7, in Chicago. Mr. Doell was a past-president of National Egg Products Association, and was a member of the Institute of American Industries' frozen egg committee.

Vladimir K. Kedrovich, 64, president of Old Dutch Mustard Co., Inc., Brooklyn, N. Y., March 29, in Richmond Hills, Queens.

L. David Larsen, 58, vice-president and director of C. Brewer & Co., Honolulu, T. H., and widely known in the Hawaiian sugar industry, April 8, in Honolulu.

George W. Schlageter, 67, a member of the candy industry for many years, March 31, in Cincinnati, Ohio.

Philip B. Scott, 59, superintendent of Roeding Fig and Olive Co., Fresno, Calif., for 10 years, March 29.

LEWIS W. WATERS

Lewis W. Waters, vice-president in charge of scientific relations for General Foods Corp., New York, died on March 31 at the age of 55. Mr. Waters, who was well known in the food industry, joined the staff of General Foods in 1928, as assistant to the executive vice-president in charge of research and development. Two years later he was made vice-president in charge of these activities. He was a member of the American Chemical Society, the Institute of Food Technologists and the Society of Chemical Industry.

ASSOCIATED INDUSTRIES

Arthur S. Allen, package designer and at one time consulting color editor of FOOD INDUSTRIES, died on April 9, in New York City. He was 77 years old.

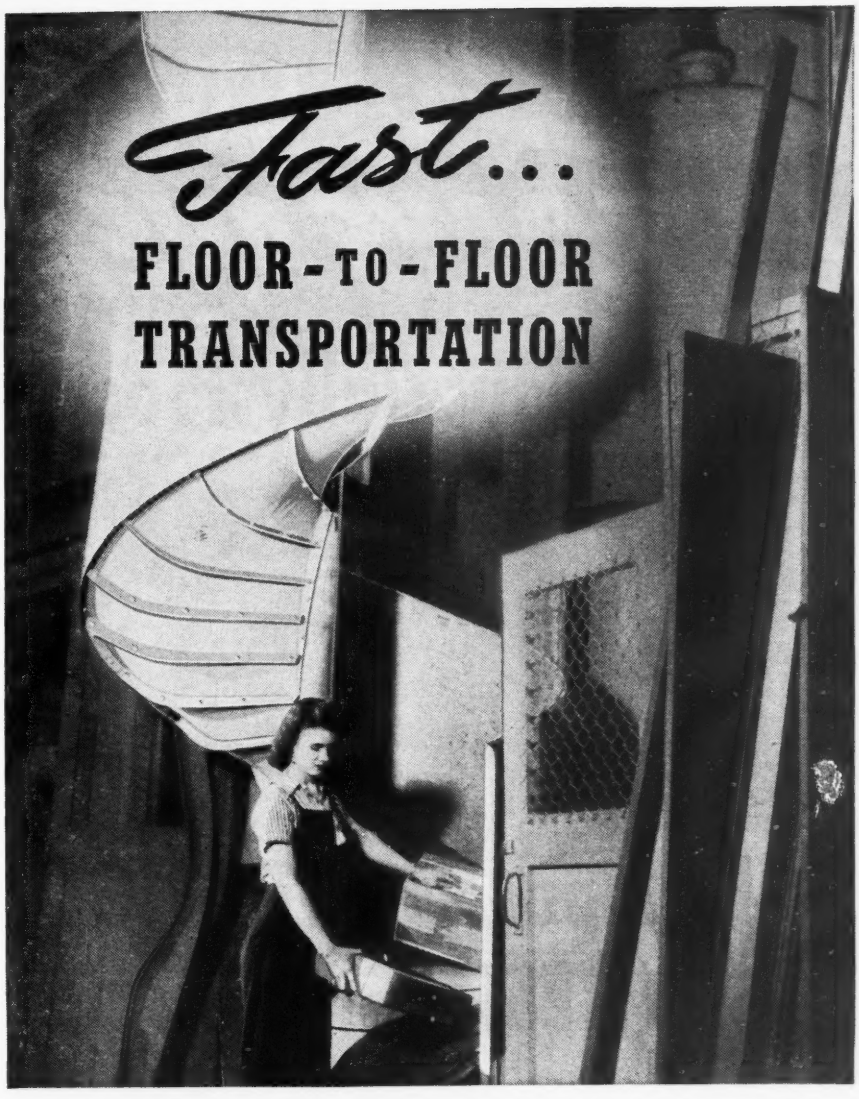
Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has appointed William C. Johnson, James M. White and William A. Roberts, vice-presidents of the organization.

Cincinnati Industries, Inc., Cincinnati, Ohio, and Edward Katzinger Co., Chicago, have been awarded the Army–Navy "E" for excellence in production. Buffalo Pumps, Inc., has been given a third star to add to its pennant.

A. F. Rucks has been made president and general manager of C. J. Tagliabue Manufacturing Co., Brooklyn, N. Y., succeeding C. D. Waters. Mr. Rucks has been associated with the company for over 30 years, during which time he held a number of important positions in the organization.

Marathon Paper Mills Co., of which Menasha Products Co. is a division, has taken over operation of Hoskin Paper Co., Menominee, Mich., on a long-term lease with option to purchase.

Noble Stormont, a flavor chemist, has joined Food Materials Corp., Chicago, as director of chemical research.



. . . Standard Spiral Chutes move merchandise from upper to lower floors . . . with SPEED and minimum handling cost

If you have material on the second floor—or the twentieth, for that matter—and want to get it to street level or the basement, there are several methods you could use. You could carry it down, step by step, or use an elevator.

A better method — quickest and lowest in cost — is the spiral chute. The spiral chute has volume carrying capacity, runs up no power bills, and is always ready for service. It reduces handling costs and saves time.

Scientifically pitched and skillfully designed spiral chutes are part of Standard's wide line of handling equipment, developed during almost forty years of solving industry's inside-the-plant transportation problems.

Get complete information on Standard Spiral Chutes and how they can be used to advantage for the handling of a wide range of products and merchandise.

STANDARD CONVEYOR COMPANY
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities

Write for valuable reference book—"Conveyors by Standard" —Catalog No. FI-54

★ ENGINEERED FOR FASTER PRODUCTION ★

HOT DAYS AHEAD!

...then especially foods need *DOUBLE* protection

In warm weather the moisture and grease in foods rise to the surface. And if a food is protected with an ordinary wrapper there's trouble. The surface moisture and grease make the wrapper "fog up", disintegrate, leak. The way to avoid this trouble is to use a double-duty wrapper—one that is proof against *both* moisture and grease.

Patapar is STRONG WHEN WET ...RESISTS *GREASE*, too

Patapar* Vegetable Parchment is the great wet-strength paper. You can soak it in water indefinitely—even *boil* it and it will remain firm and strong.

As for *grease,* Patapar has amazing ability to resist the penetration of grease, fats, oils.

179 types of PATAPAR

Patapar is produced in a wide range of variations or types. There are types of Patapar to handle problems of extreme grease or moisture penetration. Another type of Patapar resists penetration of air. There's a Patapar for food products which must have wrappers that allow them to breathe. All in all, 179 types of Patapar have been perfected to cover a wide variation of applications.

It's the year 'round paper for

WRAPPERS for butter, meats, fish, cheese, poultry, shortening, ice cream, vegetables, dried fruits
CARTON AND BOX LINERS
BULK PACKAGING UNITS
MILK CAN GASKETS
MILK BOTTLE HOODS
PACKAGING COFFEE AND TEA

And many other uses

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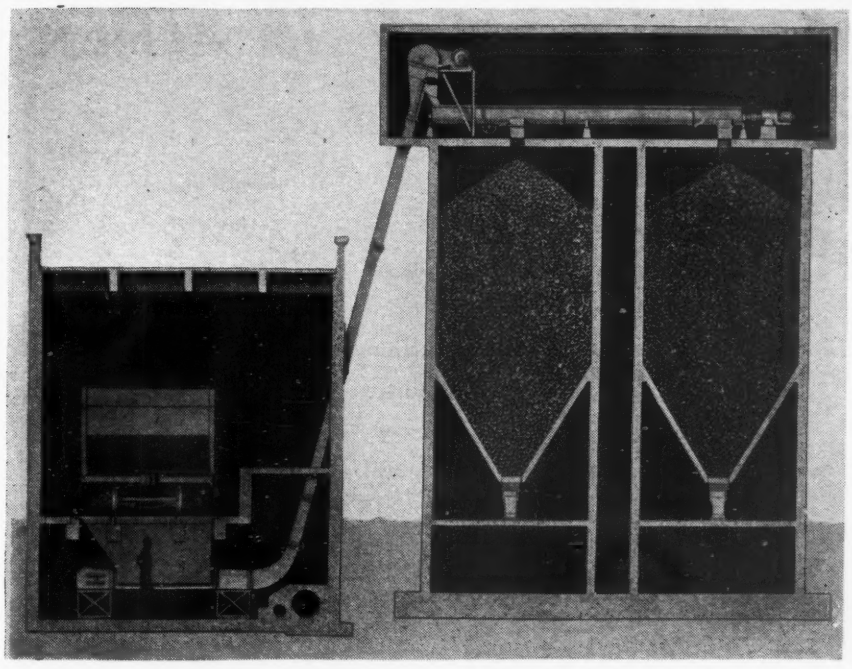
FOOD EQUIPMENT NEWS

Materials Conveyor

DESIGNED for the mass handling of free-flowing bulk materials, the new conveyor-elevator system made by Chain Belt Co., Milwaukee, Wis., is known as the Rex Uni-Flo. This is a conveying unit of the continuous-stream type. It is composed of a chain belt, with closely spaced scraper-carrier flights, operating in an enclosed casing. With the entire cross section of the casing and all the space between the flights filled with the material being handled, a continuous flow of material results.

The unit has a positive discharge mechanism that removes all material in the conveyor system at the point of discharge. The system is self-feeding, self-cleaning, and is said to effect a minimum of churning and degradation of the materials being handled. It operates at relatively slow speeds, reducing maintenance worries.

Materials can be conveyed horizontally, vertically or at any angle. And because it is essentially a closed circuit method of handling, it is clean and dust-free.

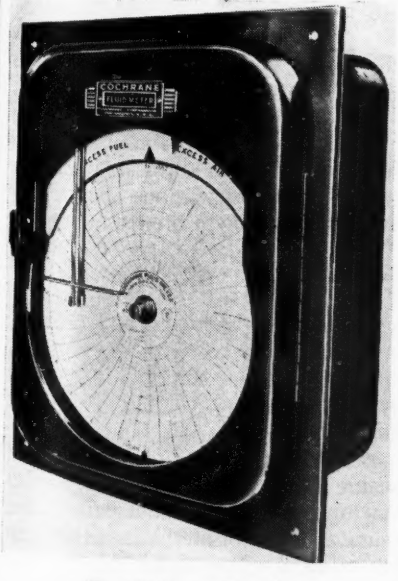


Enclosed dust-free conveyor-elevator system.

Boiler Control Meter

VARIOUS advantages are claimed for the new boiler ratio meter introduced by Cochrane Corp., 17th St. below Allegheny Ave., Philadelphia 32, Pa. This instrument is of the steam-flow, air-flow type. The operator can establish the relation of air supply to fuel supply (measured by steam generated) most favorable to his particular operation by means of an easily adjustable cam in the air-flow mechanism. A red indicating pointer, operating across a white 10-in. scale, makes it unnecessary to examine closely the position of the pens to determine whether the air is excessive or insufficient, the movement of the pointer being three times as great as the differences between the pens.

The steam-flow mechanism is that of the standard Cochrane friction-free electric flow meter, operating on the null-balance principle. The air-flow mechanism incorporates a sensitive diaphragm and is equipped with an electric motor follow-up to provide ample power.



New boiler ratio meter.

Sheave

ALLIS-CHALMERS MFG. CO., Milwaukee, Wis., has brought out the "Magic-Grip" sheave, designed for quick and easy mounting and demounting. This sheave locks to the shaft in one tightening operation. As its tapered split bushing, which accommodates normal shaft tolerances, is drawn further into the sheave, the sheave and bushing and shaft are simultaneously locked together. This clamp fit is said to be positive, secure and perfectly centered, and to assure smooth running performance free from back-lash and shear.

The company states that the new design permits the sheave to be mounted closer to the motor, increasing bearing life by reducing shaft overhang. These sheaves will be available in a complete line.

Portable Conveyor

EITHER fixed or variable belt speed is provided in the new Ultimate portable conveyor table manufactured by Island Equipment Corp., 101 Park Ave., New York, N. Y. Power is supplied by a separate "packaged" power unit. This portable conveyor is furnished with canvas, rubber or wire belt in various widths, with or without side leaves on one or both sides. A series of the units may be mounted together to form a conveyor table of any desired length. The standard length is 10 ft., but special lengths may be ordered.

Engine-drive Generator

OF interest to food processors who need portable or emergency power units are the alternating-current generators designed for gas-engine drive announced by Century Electric Co., 1806 Pine St., St. Louis, Mo. The generators are available in sizes from ½ to 150 kva. for direct connection or belted drives.

Shown in the accompanying illustration is a unit with a revolving-field generator arranged to bolt directly to the engine housing, the generator shaft being machined to receive a flange that bolts to the engine shaft. This

RYERSON STEEL IN STOCK

Call Ryerson for any kind, shape or size of steel you need. Steel for manufacturing, maintenance or construction ...all products are available for immediate shipment from any one of the ten convenient Ryerson Steel-Service Plants. Ask for a stock list...your guide to steel.

Principal Products Include:

Bars • Shapes • Structurals
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Babbitt • Nuts • Bolts
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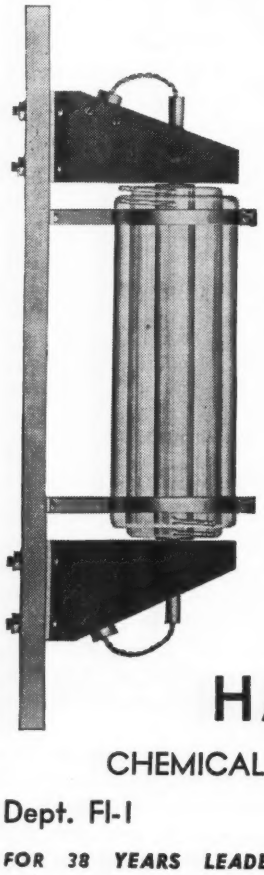
JOSEPH T. RYERSON & SON, INC.
STEEL-SERVICE PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, DETROIT, CLEVELAND, CINCINNATI, BUFFALO, BOSTON, PHILADELPHIA, JERSEY CITY



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VITAMIN D

FROM STEROLS BY

IRRADIATION

WITH ULTRA-VIOLET RAYS

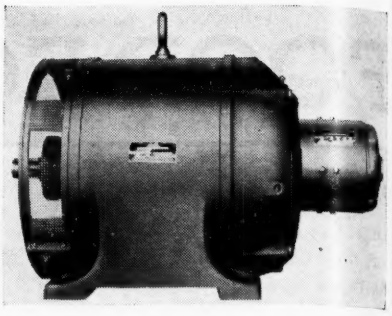
Write for full particulars

HANOVIA

CHEMICAL & MANUFACTURING CO.

Dept. FI-1 Newark, 5, N. J.

FOR 38 YEARS LEADERS IN SPECIAL ULTRA-VIOLET EQUIPMENT



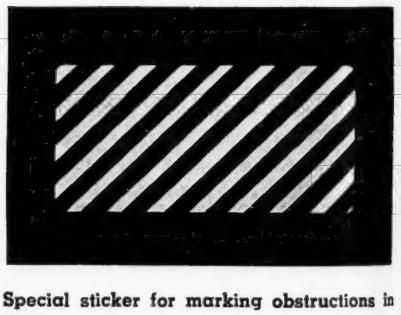
Alternating-current generator for gas-engine drive.

generator has one bearing, with the engine end of the shaft supported by the engine bearing. The exciter is mounted on the end of the generator opposite the engine, and the exciter shaft is inserted in, and keyed to, the generator shaft on the inner end. The generator bearing carries the exciter, which has only one bearing at the outer end.

The generator and exciter are arranged to use a small amount of space and, together with the engine, form a compact power unit.

Hazard Marker

USEFUL in accident-prevention efforts in factories is a special sticker developed to mark clearly obstructions in dark areas. Made by Avery Adhesives, 451 East Third St., Los Angeles, Calif.,



Special sticker for marking obstructions in dark areas.

the sticker measures 4 x 2 ft., and is black and white with diagonal stripes. It has a special adhesive backing which permits application without moistening to any smooth surface. It can be peeled off easily without scraping or tearing, according to the manufacturer.

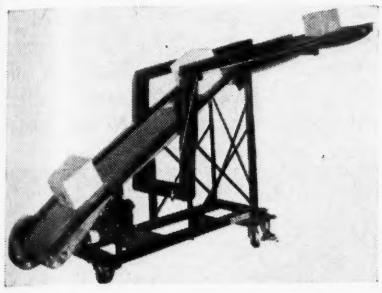
Carton and Bag Piler

CARTONS, cases and bags can be loaded, unloaded or stacked with the portable, inclined, belt-type conveyor introduced by Standard Conveyor Co., North St. Paul, Minn.

A different method of lowering and raising the carrier frame is used on this machine. The adjustable part of the frame is fully counterbalanced. It can be adjusted either from the floor or from the top of the pile. The absence

of supporting structure under the adjustable boom permits this part of the piler to project over the pile or into a car or truck without interference.

The piler is made in three sizes, with the high end of the carrier adjustable up to 7½, 8½ and 9½ ft., which provides for stacking commodities up to 12, 13 or 14 ft. It can handle individual commodities up to 100 lb., or a total uniformly distributed load of 25 lb. per square foot.



Inclined, portable, belt-type piler.

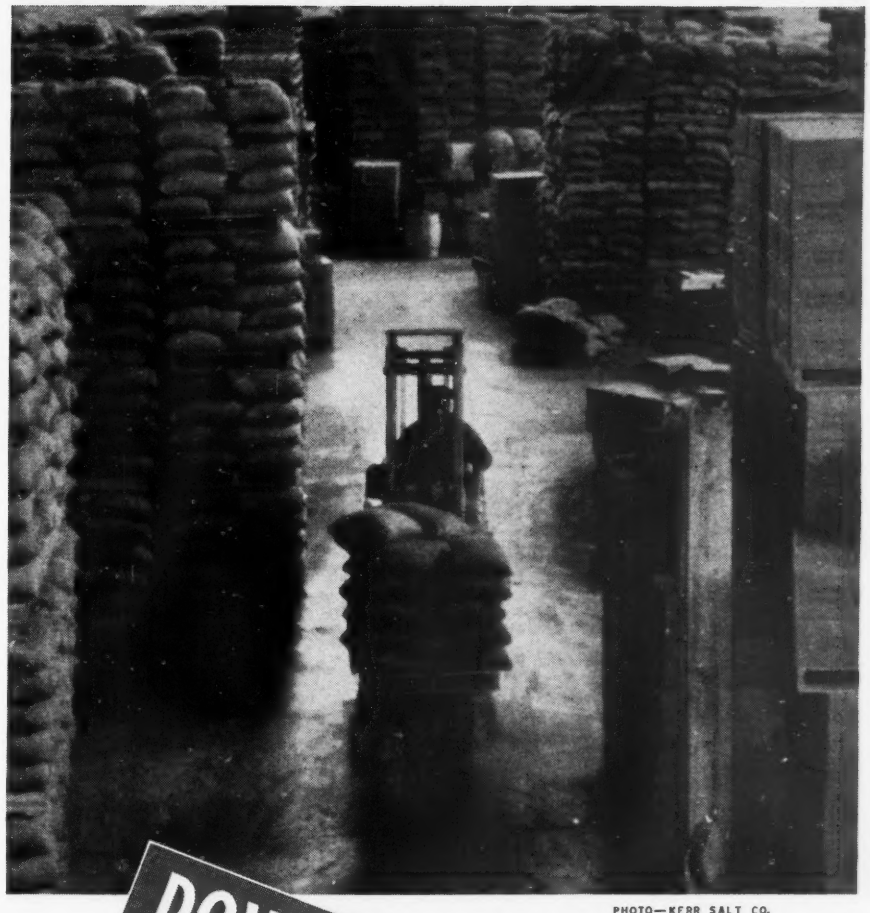
Intended especially for use in crowded places, platform work and truck loading, the piler is self-contained, with the power mechanism mounted on the base frame of the machine.

Combustion Control

LEEDS & NORTHRUP CO., 4934 Stenton Ave., Philadelphia 44, Pa., has developed a new system of combustion control that is said to make available to the smaller industrial power plant a regulation as effective and reliable as that for large central stations.

Designated Type P Combustion Control, this system can be used with coal-, oil- or gas-fired boilers. It continuously proportions fuel and air to steam demand and, at the same time, controls furnace pressure. To regulate fuel feed and draft (either forced or induced), the system provides a simple electrical balance (using the Wheatstone-bridge principle) by which the settings of valves, dampers or vanes are varied in definite proportion to steam demand as directed by a master controller. The remaining draft damper or other device is simultaneously regulated by a furnace pressure controller.

If for any reason the operator does not desire full automatic control, he can move any of the drive units from pushbutton stations. Without leaving the panel, he can switch from (1) full automatic control to (2) base load control, and regulate air supply from a single pushbutton, with fuel supply automatically following in the proper relationship and with furnace pressure automatic. He can also (3) regulate both air and fuel from pushbuttons, with furnace pressure automatic or



PHOTO—KERR SALT CO.

1 man, Towmotor DOWN THE AISLE and 20 bags

A simple job for the operator (man or woman) when Towmotor is along. Why? Because a Towmotor Lift Truck, known everywhere as the one-man-gang, supplies the power and speed for all types of handling operations where efficiency, maneuverability and speed are required.

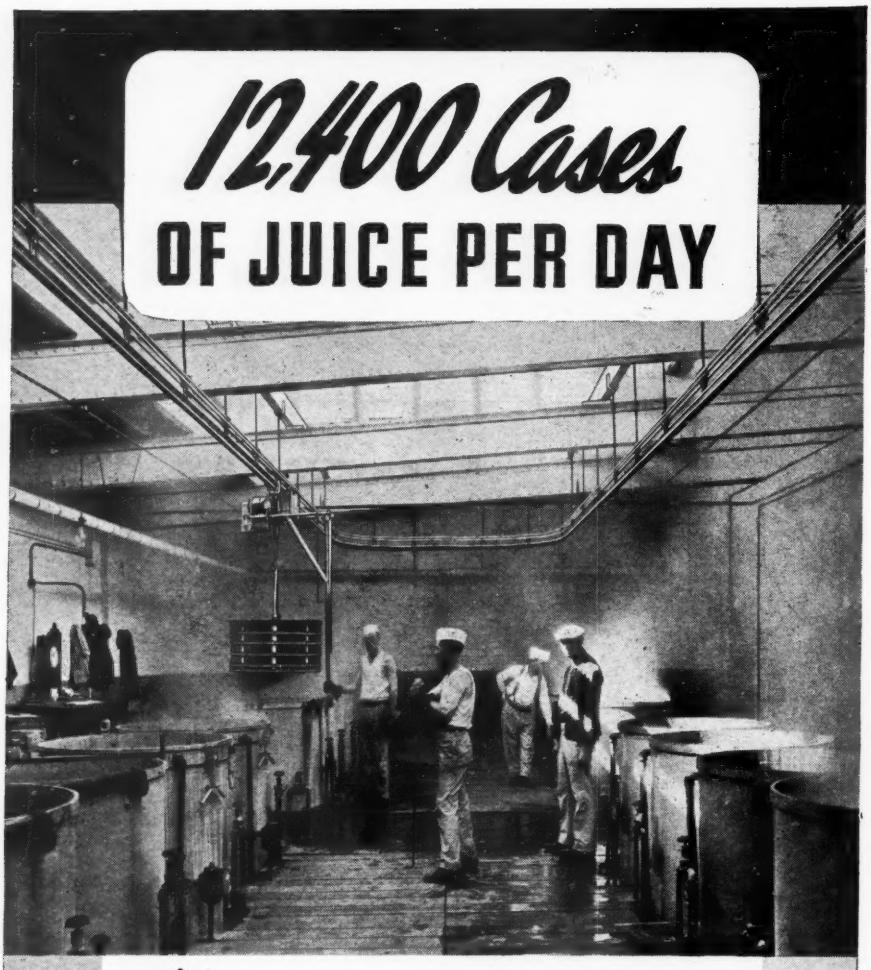
Here's what Towmotor will do: lift, move and stack loads as heavy as 10,000 pounds; travel as fast as 880 feet a minute; build stacks as high as 25 feet . . . all this with just one man at the controls. Think what this can mean to you in terms of *more efficient use of manpower, increased storage space* and *savings in time and money?*

The answers to your questions—to a more profitable and efficient handling system—are found in Towmotor's "DATA FILE." Write Towmotor Corporation, 1222 E. 152nd Street, Cleveland 10, Ohio . . . there's a free copy for you.

TOWMOTOR

THE 24-HOUR ONE-MAN-GANG

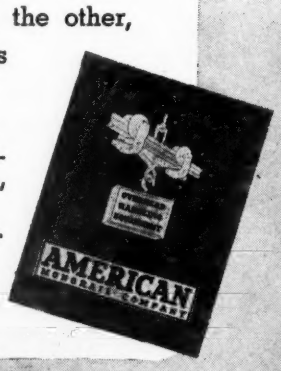
12,400 Cases OF JUICE PER DAY



Operating on two shifts this Midwestern company, specializing in tomato juice, has been producing 12,400 cases per day. American MonoRail Equipment plays an important part in this production... all manual handling and rehandling is eliminated and material moves on quick, accurate schedules. You, too, can speed up your production if American MonoRail Overhead Handling Equipment is on the job.

American MonoRail provides rapid, careful transfer from one operation to the other, from cooking and cooling process to piling of cartoned goods.

Let an American MonoRail Engineer show you "all round savings" with this equipment. Write today.



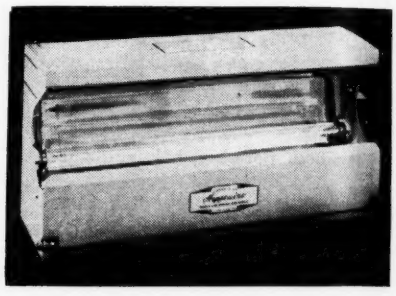
Send for Bulletin C—1. A 56 page book showing successful applications of American MonoRail systems.

THE AMERICAN MONORAIL CO.
13125 Athens Avenue — Cleveland 7, Ohio

(4) he can switch to complete push-button control. This independent operation of drive units allows the controllers to be serviced without interruption of boiler operation.

Germicidal Lamp

BACTERIA in the air in plant and office areas are said to be killed by the new Hygeaire system manufactured by American Sterilizer Co., Erie, Pa. This unit is a combination of the G. E. germicidal tube and a patented reflector in a fixture designed to project a zone of protection across an area above eye level. Air-borne bacteria and viruses are carried into the zone of

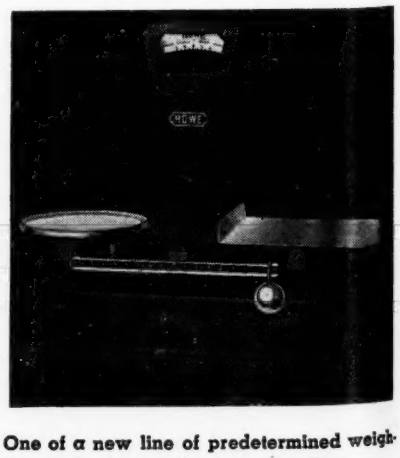


Germicidal lamp for plants and offices.

ultraviolet rays by convection air currents, giving to the protected space the germicidal effect of 100 air changes per hour. The purpose of this germicidal unit is to protect the health of employees and thereby reduce absenteeism. It may be installed in plant areas, offices, dispensary waiting rooms, plant cafeterias, and so forth.

Check-weight Scales

A NEW line of scales that may be used for check-weighing packages have been announced by the Howe Scale Co., Rutland, Vt. These scales are offered in a variety of shapes, capacities and platter sizes. Sturdy construction, quick performance and accuracy are claimed by the manufacturer.



One of a new line of predetermined weighing scales for packaging operations.

FOAMGLAS*...

the NEW Insulation That's Permanently Efficient

FIREPROOF!

Since it's cellular glass, this new low-temperature insulation just won't burn. As a result, it reduces the fire hazard and conforms with requirements for a non-combustible insulation material.

PHYSICAL PROPERTIES

Average crushing strength, 150 lbs. per sq. in.
Modulus of rupture.....90 lbs. per sq. in.
Modulus of elasticity, 163,000 lbs. per sq. in.
Impact resistance.....66 foot-pounds
Absorption (24 hr. immersion in water), 0.4% by volume, 2% by weight (all at surfaces)
Permeability 0
Capillarity 0
Volume change with moisture.....0
Conductivity (K at 50° F.), 0.45 B.T.U. per hr. per sq. ft. per °F. per in.
Specific heat..... .16-.19 per lb. per °F.
Coefficient of expansion.....46 × 10^{-7}

STRONG!

Tests made in Armstrong's technical laboratories show that the compressive strength of Foamglas averages 150 lbs. per sq. in. Walls and partitions of this unusually strong insulation are self-sustaining up to 18′ in height. For most types of solid walls or partitions, Foamglas can be erected without framing members. The result is greater economy in construction because of reduced labor and material costs.

MOISTURE- and VAPORPROOF!

Made of thousands of tiny cells isolated from one another by thin glass walls, Foamglas is impervious to moisture and vapor. Thus this insulation is as efficient years later as the day it was installed.

~ ~ ~

The combination of these important properties in a low-temperature insulation makes Foamglas a material well worth investigating. Complete physical data will be furnished on request. Write today for the booklet, "Armstrong's Foamglas," to Armstrong Cork Company, Building Materials Division, 4205 Concord Street, Lancaster, Pennsylvania.

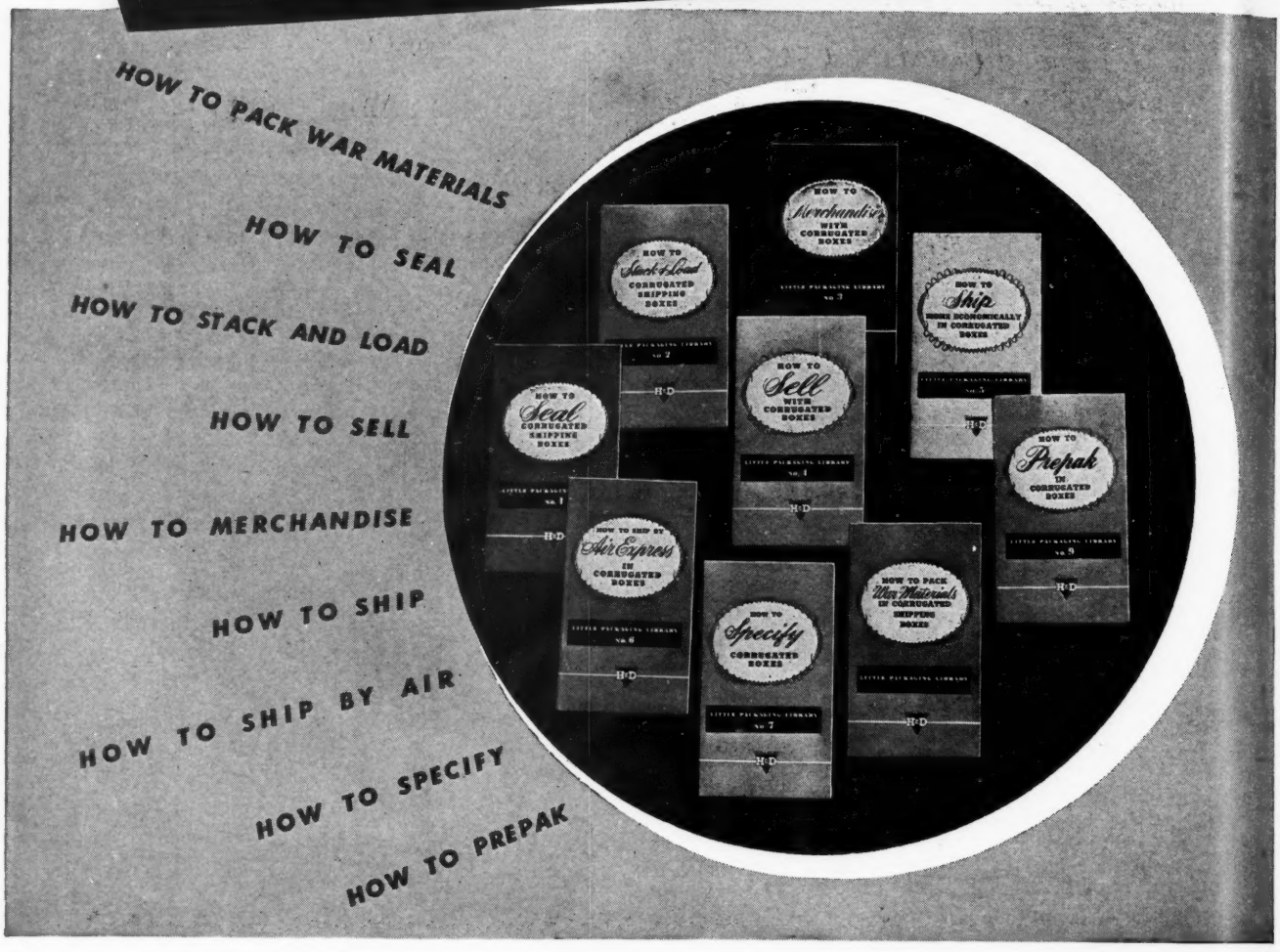
* Reg. U. S. Pat. Off. Product Mfg. by Pittsburgh Corning Corp.

ARMSTRONG'S FOAMGLAS

A product of Insulation Headquarters

CORKBOARD • MINERAL WOOL BOARD • CORK COVERING

9 WAYS TO BETTER POST-WAR PACKAGING



H & D Little Packaging Library—FREE on Request

Packaging war goods — that's the all-important task of H & D today, BUT H & D's war-time activities are bringing a wealth of valuable experiences, and an abundance of new packaging skills and techniques that will have a great and good effect on the progress of post-Victory packaging.

With packaging trends constantly changing and packaging materials under continuous development, H & D published its Little Packaging Library to make your entire packaging procedure more efficient. The "Library" presents the packaging experience of hundreds of manufacturers and contains many real contributions to improved packaging and shipping methods to savings in materials, manpower, machinery and transportation facilities.

Whatever your packaging assignments are today — whatever they will be tomorrow, these booklets will prove of value to you and your organization. The booklets are FREE without obligation — write for as many sets as you need. Address Hinde & Dauch, 4409 Decatur Street, Sandusky, Ohio.

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AUTHORITY ON PACKAGING . . . CORRUGATED SHIPPING BOXES

CATALOGS & BULLETINS

FOOD PLANT EQUIPMENT

Direct-current Motors—Direct-current motors in sizes ranging from ⅛ to 300 hp. are described and illustrated in Catalog 10-1 P 1 published by Century Electric Co., 1806 Pine St., St. Louis 3, Mo.

Feed-Water Equipment — Illustrations of equipment available for removing gases from either hot or cold water and removing oxygen and carbon dioxide from water without the use of steam are shown in Bulletin 4076, "Degasification of Water," by Cochrane Corp., 17th & Allegheny Ave., Philadelphia 32, Pa.

Steam-jet Vacuum Pumps—Single- and multi-stage steam jet vacuum pumps in many sizes and types for low- and high-vacuum work are fully described, and features of construction and principles of operation are shown, in 36-page Bulletin No. 5-EH by Schutte & Koerting Co., 12th & Thompson Sts., Philadelphia 22, Pa.

Speed Reducers—The part speed reducers play in canning plants, in sewage and water-treatment plant service and in other industrial factories is illustrated by photographs in a 24-page catalog, "WHS is Part of This Picture"; issued by Winfield H. Smith, Inc., Springville, Erie County, N. Y.

Unit Heaters—"Economical Heating for Industrial Buildings," a 2-page bulletin, 46E-22, describing a unit heater with a propeller fan for horizontal discharge, for operation on saturated steam at working pressures up to 200 lb., has been issued by Carrier Corp., Syracuse 1, N. Y.

PLANT SUPPLIES

Filter Papers—Twenty-three samples of filter papers used in filter presses, filtering machines and funnels for large-scale filtrations are displayed in Bulletin No. 66, by Carl Schleicher & Schuell Co., 116-118 W. 14th St., New York 11. Analytical filter papers for laboratory use are found in Bulletin No. 65.

Industrial Brushes—Pictures of numerous types of Fuller industrial brushes, such as fiber broom, textile, dust, bench and machine brushes, and illustrations of these brushes in meat, baking and other industrial plants, can be found in 62-page Industrial Catalog No. 10 published by Industrial Division, Fuller Brush Co., Hartford, Conn.

Plant Sanitation—Methods of using various chemical products for cleaning food plant equipment, for specific sanitation jobs and for fumigation and insect control are covered in a 16-page booklet issued by Rex Co., Burlington, Iowa.

Resins and Plastics — The characteristic properties of Geon polyvinyl resins and plastics are discussed, and suggested applications of these products in industry are given, in a 4-page booklet put out by Chemical Division, B. F. Goodrich Co., Akron, Ohio.

V-Belt and Sheaves—Simplified engineering data for fractional horsepower drives, installation photographs, line drawings and selection tables for Texrope F/HP V-belt drives are offered to manufacturers and operators, in Bulletin B6249 by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

MATERIAL HANDLING

Car Pullers—For use wherever railroad cars must be spotted for loading or unloading, or for docking barges and handling moving operations in many industries, Jeffrey all-purpose car pullers, which handle from 2 to 6 cars at a time, are described and illustrated in Bulletin 774 issued by Jeffrey Mfg. Co., Columbus 16, Ohio.

Conveying Equipment—Application data and specifications for open and covered pan and tubular vibrating types of Ajax Lo-Veyors, for conveying bulk materials in food plants and other industries, are given in Bulletin 32 by Ajax Flexible Coupling Co., Westfield, N. Y.

Industrial Trucks—A 20-page handbook on handling materials with power trucks has been published as Catalog No. 52 by Baker Industrial Truck Division, Baker-Raulang Co., Cleveland 13, Ohio.

Materials Handling Equipment—The application of the unit-load principle to shipping, receiving and warehousing operations is described in a booklet, "Unit-Loads; Their Handling, Shipment, Storage." Pictures of unit-load handling equipment, the loading and unloading of cars and the assembly of unit loads illustrate this booklet published by Industrial Truck Statistical Association, 208 S. La Salle St., Chicago 4.

Conveyor-elevator—To be used in the mass handling of free-flowing dusty, fine or granular materials, such as chemicals, foods and feeds, Rex Uni-Flo conveyor-elevator equipped with closely spaced scraper-carrier flights which operate in an enclosed casing, are described and illustrated in Bulletin 442 by Chain Belt Co., 1644 W. Bruce St., Milwaukee, Wis. Capacity tables, horsepower formulas and diagrams also are given.

CONTROL EQUIPMENT

Multispeed Drum Controllers—Descriptions, prices, wiring diagrams and dimensional drawings of over 200 different multispeed drum controllers, ranging up to 10 hp., can be found in Bulletin 4303 issued by Furnas Electric Co., Batavia, Ill.

Steam Plant Instruments—A 23-page, revised edition of "Micromax Condensate-Purity Instruments for the Steam Plant," which discusses the means of preventing contaminated condensate from reaching boilers and prime movers, is being offered by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia 44, Pa.

Pressure Gages—A 12-page bulletin, fully explaining the rotary movement of phenol turret case Duragauge pressure gages, and including the design and construction of the system and illustrations of 31 types of dials available, is put out by Manning, Maxwell & Moore, Inc., Bridgeport 2, Conn.

Thermocouples—A new 36-page edition of "Thermocouple Data Book and Catalog," Bulletin S2-4, describing various types of thermocouples and listing prices and recommendations for thermocouple users, has been published by Wheelco Instruments Co., Harrison & Peoria Sts., Chicago 7.

PACKAGING

Bar Wrapper—Specifications and a schematic diagram illustrating the Model DF die-fold adjustable candy bar wrapper are found in a 4-page bulletin put out by Package Machinery Co., Springfield, Mass. An important feature of the DF is its new "tuck-in" fold which makes a wrap suited to vending machines.

Can Washer Maintenance—Manual No. 12, "D-Plus Formula for Can Washer Maintenance," illustrating practical steps which should be followed in keeping can washers operating efficiently, has been published by Cherry-Burrell Corp., 427 W. Randolph St., Chicago.

Wrapping Machines—A complete line of labor- and cost-saving wrapping machines, which can be adjusted to different package sizes, are illustrated in a short pamphlet "How Packaging Costs are Being Lowered," by Package Machinery Co., Springfield, Mass.

Wrapping Unit—Specifications and a schematic drawing illustrating the Model FA wrapping machine have been published in a 6-page catalog by Package Machinery Co., Springfield, Mass.

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CATALOG PAGES
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3604 Mayflower Street **Jacksonville 3, Florida**

Sulphiting Cabbage

(*Continued from page* 76)

maintain a certain level of liquid in the trough and also the concentration of the sulphite. This can be done by withdrawing definite quantities from a supply barrel of more concentrated solution and adding the proper amounts of water. Specific recommendations require some knowledge of actual operating conditions in the individual plants.

Cleaning the Spray Head

It will be found convenient to set the grid-type spray head in a light frame on the continuous-type blancher, so that during rest periods and temporary shut-downs the frame can be inverted and inspected. If necessary, a fine wire can be run through each hole to ensure proper operation. The pipe ends should be closed with removable caps to permit flushing out periodically. The spray must be set with regard to available drains, so that the surplus solution runs back toward the entrance end of the blancher.

For convenience, the chemical normalities and concentrations in terms of SO_2, shown in approximate relation to the quantities of the sulphite salts required in the tanks per 100 gal. of solution, are given in the accompanying table.

Preparation of Solutions

The sulphite solution may be prepared from a concentrated stock solution containing 10 to 15 percent of the salts by diluting before application. Mixing with water can be accomplished by using a suction tee equipped with appropriate flow meters. The simplest method is direct preparation of a solution of the concentration to be applied. Two wooden tanks of 600- to 1,000-gal., or even greater, capacity are needed. The tanks should be located close to the blancher, and mounted on a platform so the solution can be fed by gravity to the sprays. The head should be sufficient (about 12 ft.) to provide good delivery from the jets and to avoid excessive pressure variation as the level of the solution is lowered in the tank. The second tank is needed to permit replenishment and continuous operation. If space is not available near the blancher to provide sufficient head for gravity flow, the tanks may be located elsewhere and the solution pumped to the spray unit. Where the dilute solution is prepared, a cycle of 1 to 2 hours is ordinarily required, depending upon the flow rate employed.

The problem of mixing in the tanks is of extreme importance. In one

plant having 1,000-gal. tanks, early runs gave a product which varied in final SO_2 content beyond the specification limits. This trouble was traced to inadequate mixing, and was eliminated by mechanical mixing. Slowly revolving wooden blades attached to a wooden shaft are quite satisfactory for this purpose.

The following precautions should be observed in preparing and handling the sulphite solutions. When the mixture of metabisulphite and sulphite is used, the former salt should be added first. This applies also in case the metabisulphite is used with sufficient soda ash to give the desired pH. Sulphite solutions, especially when dilute, are readily oxidized to sulphate when exposed to the air. They should not be held for extended periods of time. The reaction is accelerated greatly at higher pH levels and in the presence of certain metals (iron, manganese and copper). Connections from the tank to the spray grid should be of rubber hose or plastic tubing rather than iron pipe. This precaution may prevent trouble from spray clogging by scale formed by the corrosive action of the sulphite solution on iron.

Sulphite solutions are somewhat irritating to the skin and mucous membranes, so reasonable care should be exercised by employees handling the solutions. For example, in traying operations where pre-blanch dipping is employed, rubber gloves are desirable.

Corrosion Prevention

Processors of dehydrated cabbage have been concerned over the possibility of serious corrosion of equipment by sulphite solutions. The question applies not only to the equipment used in mixing, storing and applying the solution, but also the blancher, trays, and even the dehydrater itself, where metal has been used in its construction. It has been stated above that, in handling the solution, contact with metals should be avoided by employing wood tanks and rubber or plastic tubing where possible. The problem is more simple where wood-slat trays, a wooden blancher and concrete or tile tunnels are used. However, galvanized wire mesh trays are extensively used and some all-metal blanchers are in operation.

No immediate concern is felt for the metal parts of the tunnel, since there is no direct contact with the solution and sulphur dioxide given off by the cabbage will be in extremely low concentration.

In all-metal blanchers the installation of a wooden drip pan with a separate drain should offer substantial protection to the blancher bottom, but under any circumstances the belt will

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MONOCALCIUM PHOSPHATE
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CALCIUM PYROPHOSPHATE
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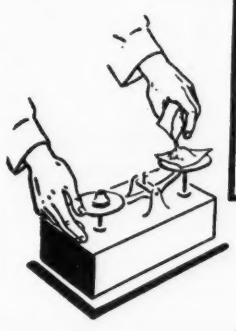

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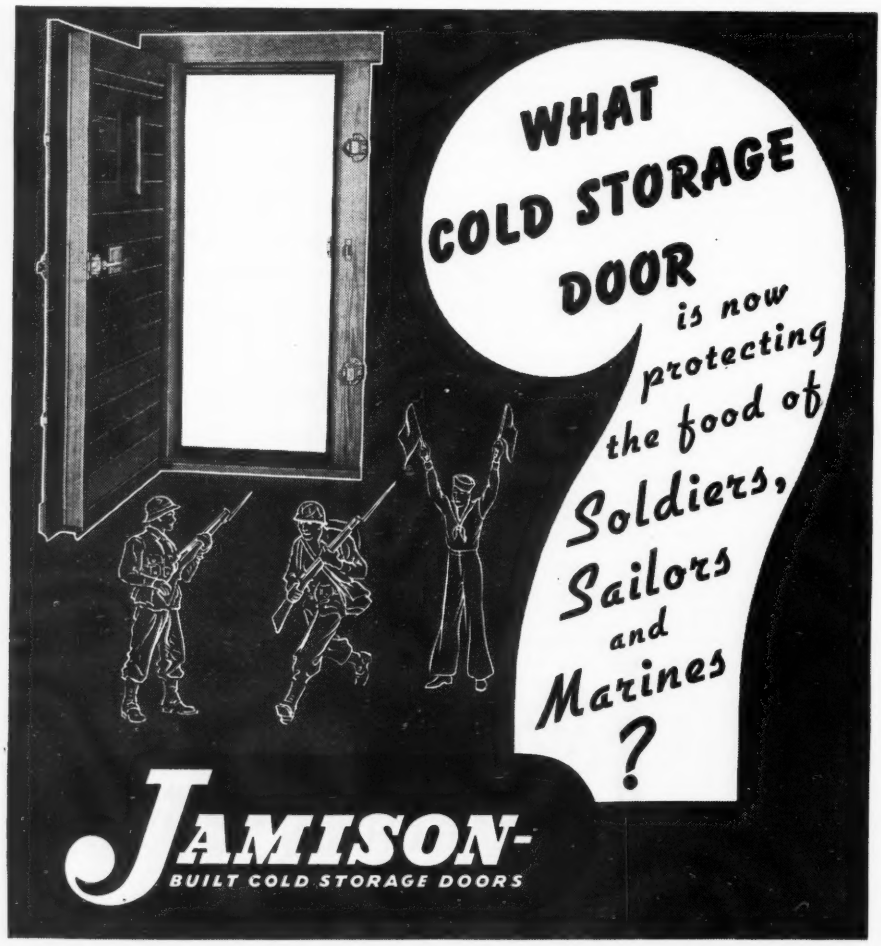


be exposed to the drainage from the cabbage. This cannot be avoided, but the effect can be minimized by control of the pH and by use of corrosion-resistant materials.

It is with wire-mesh trays that the corrosion problem is most significant since both the life of the trays and damage to quality of the dried product are involved. Cabbage stains badly upon contact with iron surfaces wet with sulphite solution. Galvanized iron-mesh trays which have developed perforations in the zinc coating do not cause much difficulty until fairly large areas of iron are exposed because the iron is more resistant than zinc to electrolytic action. The reverse is true for tinned iron screens since the iron is less noble than tin and goes into solution. Small perforations in tin coatings will cause serious staining. Some protection may be afforded by overlaying the tray with cloth before loading with cabbage. This is not considered a very satisfactory solution but, since very few tinned trays are in use and tin is so scarce, the problem is at present largely academic.

Studies are in progress on the comparative corrosion rates of galvanized wire trays loaded with untreated cabbage and with cabbage treated with sulphite solutions at different pH values. It may be stated as a general rule that the lower the pH the greater will be the corrosive action. Since cabbage itself is known to have a pH value in the neighborhood of 5.7 it is to be expected that treatment with sodium sulphite solution of pH 8 or above will actually lower the acidity of the solution in contact with the wire tray bottom. A solution of sodium sulphite and metabisulphite (1:1) has a pH of 6.7 and therefore may also be expected to lower the acidity of the cabbage though not to the same extent as the normal sulphite solution. It is, of course, possible that sulphite solutions may exert a corrosive action on the zinc disproportional to the relative pH values of cabbage alone and sulphited cabbage, but there is at present no evidence that such a factor is of great magnitude. Moreover, it must be borne in mind that in commercial practice trays employed for cabbage are rarely, if ever, discarded because of corrosion but rather because of mechanical damage. Therefore, even though the corrosion rate with use of sulphite is somewhat faster than with untreated cabbage, this may or may not be the factor which limits tray life.

It is somewhat difficult to evaluate sulphiting costs with high accuracy. In a plant processing 100 tons of raw cabbage daily in two shifts, the cost of chemicals and labor should not ex-

ceed 0.6 to 0.7 cent per pound of dry cabbage. This additional cost is probably completely offset at higher production rates because sulphiting permits the use of higher tunnel temperatures, reduces loss on the sorting belt, and results in other savings.

Summary

In the preparation of this report, two alternatives were possible. A mass of data compiled from laboratory and pilot plant operations could have been offered. The sulphiting step could not, however, be treated as a unit process, independent of other plant operations. Moreover, since available plants were already in production under Army contract, a generalized case with specific recommendations as to a possible best procedure would not be particularly useful at present.

In this study, an economically feasible and practical method was sought which could be readily adopted by plants working under severe handicaps with respect to available equipment and competent trained personnel. This has, in our opinion, been accomplished.

The nonrecirculation of the spray liquor may seem wasteful, and circumstances may necessitate modification of this step. Compared with the value of the product, the loss of sulphites is a very minor item, to which the industry may properly be expected to give consideration in due time. On the other hand, numerous additional problems relating to improvement of quality come logically within the sphere of research for the general welfare.

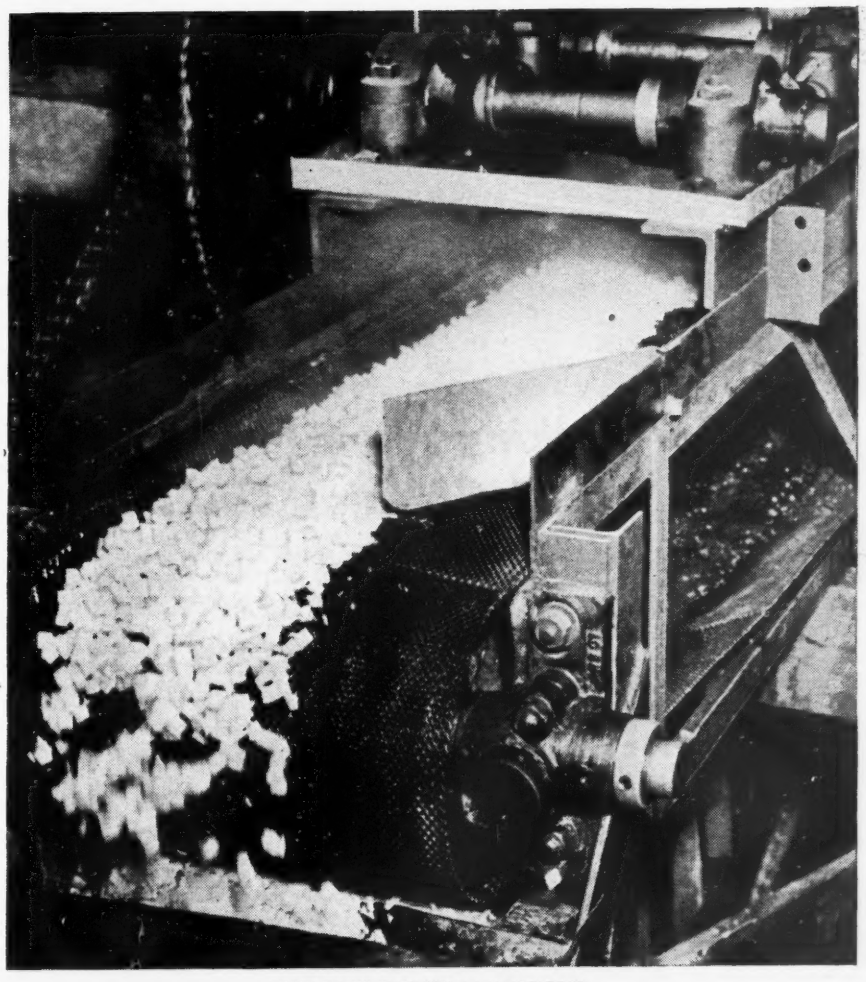
17 Ways To Get Workers

(*Continued from page* 81)

was to acquire harvest workers and the other industrial help. For the first, growers were assessed a few cents per ton on fruit brought to plants to pay the publicity expenses. For the second, an intra-industry committee combined all allied industries. Newspaper publicity asking for plant workers read: "Ladies, you can back-up that fighting man you love. Register at one of the local canneries for your war job today!" Surrounding such large ads were smaller announcements of their needs by the various processing firms.

A house-to-house canvass also was undertaken.

Very helpful were the two public nurseries in the city. One is operated by the Junior League and the other by the Community Chest. Packers say that these released quite a number of women for employment.



CONTINUOUS BLANCHING OF POTATOES

Convoy—Dehydrating—Comparable! How?

As the speed of a convoy is governed by the maximum cruising speed of its slowest vessel, so is the production output of a dehydrating plant governed by the maximum capacity of its slowest unit. If any step in your operations (see diagram lower left) is a bottleneck, remember it's costing you money in overhead (waiting time of labor and machines) and in a reduced output of salable products. . . . Bottlenecks can usually be eliminated by

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One or more or "every step" in the operation of a dehydrating plant can be a smooth, continuous, maximum capacity flow. Speed of any or every belt can be timed with the production of preceding or succeeding processing operations. Labor-saving possibilities are tremendous for Metalwove Belts are "self-loading" and "self-unloading" thereby eliminating manual handling of the product. . . . Various types of weaves, flights, retaining edges and drives, plus various specifications of wire diameter, size of opening between wires, and kinds of metal meet every dehydrating plant requirement. Our engineers will gladly assist you in selecting the correct Audubon Metalwove Belt for any operation in your "plans" or "plant."

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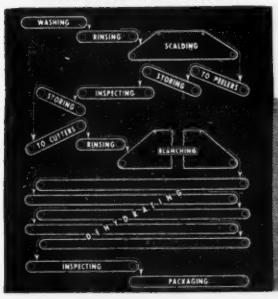

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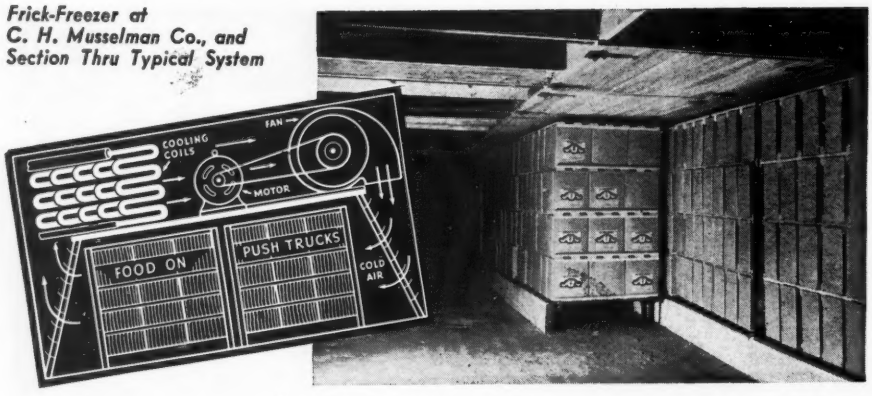

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The Walla Walla area also had a community labor survey by means of enlistment questionnaires. During that time there was extensive press and radio publicity to encourage people to fill out the questionnaires, which later became a prospect-list cataloged by the U. S. Employment Service.

What It All Adds Up To

As shown by the campaigns, the food packers used much ingenuity to obtain labor. It must be said, however, that none of the recruitment drives resulted in an actual sufficiency of workers. Yet, they all increased plant personnel to the extent that the industry topped all production records last year.

Two major points were integrated with the campaigns: (1) Providing transportation to distant plants and (2) improving working conditions. Most firms made arrangements with bus companies or sent their own vehicles, and many plants gave employees rest periods of varying duration. A few firms added coffee and doughnuts, either gratis or at a small purchase price.

For some allied phases of the labor problem no solutions could be discovered. There was a great employee turnover throughout the entire season. One firm, however, was extraordinarily successful in retaining its workers. It had the plant interior well covered with reminder placards. There was a prominent poster on the wall of every room with a quotation about the vital rôle of foodstuffs in the war effort. Complementing this theme was a mild discipline giving workers a sense of responsibility for production. The supervisors maintained a feeling of friendliness and appreciation of patriotic effort but kept a busy tempo. They shared the production aim with the employees by telling them of any large output the day before or explaining about an unusual raw produce arrival. This firm succeeded in doubling its pack.

Observed in several plants was a tendency to be too lenient in an effort to hold the employees, and this resulted in a time-killing attitude. Such a lack of direction also destroys the value of a preceding patriotic appeal to come to work.

As for the more acute shortage of men workers, some replacement is possible. One large processor had women running all the canning machinery, with satisfactory results. And women can be useful on a loading platform. Girls do well such tasks as recording the raw produce and tenderometer testing, thereby releasing men for manual work.

PATENTS

Poultry Mechanically Picked by Action of Flexible Studs Projecting Radially From Rotating Drum and Having Plurality of Slots Across One Face and One Slot Across Outer End—Otis Sandlin, to Whistler's Picking Machine Co., Philadelphia, Pa. No. 2,342,013. Feb. 15, 1944.

Fruits Automatically Weighed in Bulk—William O. Kinnebrew, Winter Haven, Fla., to Food Machinery Corp., San Jose, Calif. No. 2,342,053. Feb. 15, 1944.

Fresh Whole Fruit Treated With Solution of Coating Material in Volatile Organic Solvent—Odgen S. Sells and Howard L. Porch, Riverside, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,342,063. Feb. 15, 1944.

Finely Divided Cereal Products Bleached by Action With Gaseous Chlorine and Subsequent Treatment With Gaseous Nitric Acid—Charles G. Ferrari, Minneapolis, and Willis S. Hutchinson, St. Paul, Minn., to General Mills, Inc., No. 2,342,075. Feb. 15, 1944.

Dough Divided Into Predetermined Portions by Mechanical Means Equipped With Continuously Rotating Screw Feed—Millard F. Weida, to Curthalt Co., Canton, Ohio. No. 2,342,093. Feb. 15, 1944.

Artichokes Trimmed by Mechanical Means—Arvid W. Erickson, to Barron-Gray Packing Co., San Jose, Calif. No. 2,342,-131. Feb. 22, 1944.

Foods Subject to Oxidative Deterioration Protected by Addition of Antioxygenic Extract of Blackstrap Molasses—Sidney Musher, New York, N. Y. No. 2,342,162. Feb. 22, 1944.

Multiple Strips of Dough Flattened Into Ribbon Form, Turned on Edge, and Fed Into Baking Tins to Form Loaf of Laminated Dough Portions—Laurence Seymour Harber, to Baker Perkins Ltd., Peterborough, England. No. 2,342,270. Feb. 22, 1944.

Shell Eggs Lightened in Color by Peptizing Disintegration and Removal of Color-Containing Protein—James D. Ingle, to Industrial Patents Corp., Chicago, Ill. Nos. 2,342,345 and 2,342,346. Feb. 22, 1944.

Heads of Dressed Poultry Covered With Adherent Plastic Seal to Protect Surface of Carcass Against Digestive and Other Exudate During Shipment and Storage—Carl H. Koonz and James D. Ingle, to Industrial Patents Corp., Chicago, Ill. No. 2,342,350. Feb. 22, 1944.

Meats Smoked in Oven Containing Plurality of Individual Rooms or Compartments—Edward A. Schiewe, to Industrial Patents Corp., Chicago, Ill. No. 2,342,373. Feb. 22, 1944.

Foods Conditioned and Stored in Bins Mounted on Wheels and Moved From Station to Station in Endless Conveyor Manner—Nathan A. Hallwood, Columbus, Ohio. No. 2,342,468. Feb. 22, 1944.

Hog Carcasses Moved to and From Tank for Coating Purposes by Overhead Rail Trolley Conveyor—Arthur E. Ozouf to Allbright-Nell Co., Chicago, Ill. No. 2,-342,598. Feb. 22, 1944.

Casein Coagulated With Acid and Treated With Acetic Anhydride and Ketene—Francis Clarke Atwood, Newton, Mass., to National Dairy Products Corp., New York, N. Y. No. 2,342,634. Feb. 29, 1944.

Foods Frozen in Rotatable Walled Container While in Contact With Continuous Stream of Refrigerant Liquid—James O. Tankersley, Knoxville, Tenn., to Tennessee Valley Authority. No. 2,342,706. Feb. 29, 1944.

Casein Dispersed by Glycollic and Lactic Acid Plasticized by Treatment With Diethanolamide of Formic Acid, Made Insoluble by Formaldehyde and Made to Contain Small Amounts of Higher Acyl and Higher Alkyl Pyridinium Halides—Edouard M. Kratz, Ogden Dunes, Ind., to Kraft Cheese Co. No. 2,342,739. Feb. 29, 1944.

Cheese Wrapped in Flexible Absorbent Material Containing Slits Through Which Entrapped Air is Forced During Tight Wrapping of Cheese Preliminary to Dipping in Melted Wax—Daniel E. Richardson, Jacob L. Michel, and Reuben J. Chadbourne to Martin Bros. Co., Denver, Colo. No. 2,342,969. Feb. 29, 1944.

Fruits, Vegetables and Other Perishables Stored in Insulated Chamber Operating Under Thermostatic Control and Equipped With Fan to Circulate Air and Maintain Desired Static Pressure Head Inside Chamber—Frederick P. Bieret, Allentown, Pa. No. 2,342,998. Feb. 29, 1944.

Starch Bleached While in Suspension by Treatment With Hypochlorite Salt in Presence of Chlorous Acid Salt at pH Between 4 and 7 and Temperature Between 80 and 125 Deg. F.—Otto H. Eble and Monroe J. Mason, to Anheuser-Busch, Inc. St. Louis, Mo. No. 2,343,048. Feb. 29, 1944.

Pears Split and Cored by Mechanically Operated Knife—Albert R. Thompson, Los Gatos, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,343,098. Feb. 29, 1944.

Legumes Dehydrated and Powdered Under Pressure of Rolls Heated to Between 400 and 600 Deg. F. After Preheating in Water to Soften—Charles A. Krause, Jr., Milwaukee, Wis. No. 2,343,149. Feb. 29, 1944.

Solids in Liquid Solutions Raised to High Concentration by Successive Freezing and Thawing Preliminary to Removal, Melting, Sterilizing and Subsequent Drying—William Shearman Burkhart, Lockland, Ohio. No. 2,343,169. Feb. 29, 1944.

Coffee Heated Under Vacuum at Lower Than Roasting Temperature for Removal of Occluded Gases and Moisture Preparatory to Roasting in Atmosphere of Inert Gas—George Sperti, Covington, Ky. to The Institutum Divi Thomae Foundation, Cincinnati, Ohio. No. 2,343,228. Feb. 29, 1944.

Fruits and Vegetables Covered With Non-aqueous, Substantially Water-impervious, Nontoxic Coating Consisting of Paraffin Wax and Spermaceti to Give Lustrous Finish and to Retard Loss of Moisture Content—James F. Hussey, Cynwyd, Pa., to Brunhilde Weller Skinner, Dunedin, Fla. No. 2,343,258. March 7, 1944.

Fruits and Vegetables Finely Cut by Mechanically Operated Rotating Wheel Having Periphery Consisting of Wire Mesh Bent to Approximate U-shape to Form Cutting Edges—Edward Lohmann, Greenville, Ohio. No. 2,343,310. March 7, 1944.

Liquid Foods Containing Solids Transferred by Pump Designed to Give Uniform Flow Without Destructive Action on Solid Particles—David William Bingham, Middle Brighton, Victoria, Australia. No. 2,343,523. March 7, 1944.

Wheat Flour Mixed With Chloroform, Carbon Tetrachloride or Similar Liquid Chlorinated Hydrocarbon, Centrifuged To Remove Grit, Sand and Like, Filtered for Removal of Solvent Containing Wheat Oil and Vacuum Dried For Removal of Solvent Vapors—Glenn E. Findley, to Tex-O-Kan Flour Mills Co., Dallas, Tex. No. 2,343,652. March 7, 1944.

Canadian Patents

Green Vegetables for Canning Blanched in Alkaline Magnesium Solution, Rinsed, Further Blanched in Alkaline Calcium Solution To Fix Color—Walter L. Schroder, Hortonville, and Thomas A. Rogers, Stevens Point, Wis. No. 418,800. March 7, 1944.

Corn Cut From Cob in Machine Having Semicylindrical Groove on Face of Cutting Unit Fitted With Curved Cutting Blade Followed by Curved Scraping Knife to Conform to Curvature of Groove Along Which Ear of Corn Moves—Arthur B. Carroll, Norfolk, Va. No. 418,803. March 7, 1944.

Sucker-type Confection Formed on Safety Stick—Edward E. Cahoon, Racine, Wis. No. 418,967. March 14, 1944.

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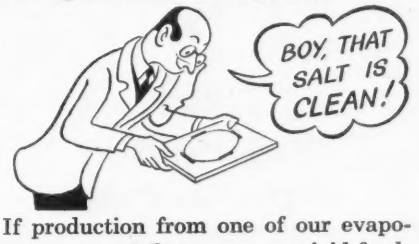

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UPON THE OUTBREAK of the present war with Japan, Germany and Italy, some 4,500 U. S. patents granted to enemy aliens and citizens of occupied countries were seized and vested in the Alien Property Custodian. In addition, several thousand patent applications of similar origin have been taken over as U. S. Government property.

These patents and the applications, when granted, are available to any interested citizen or company of the U. S. A. for examination and, if desired, for use on a licensing basis. They are available for examination in the library of the Alien Property Custodian, Room 311, 135 South La Salle St., Chicago 3, Ill. Listings of the patents by title in 33 groups—of which No. 18 deals with foods, No. 19 with fermentation, and No. 20 with fats, oils, soaps and waxes—are obtainable from the Office of Alien Property Custodian without charge. A master index is being prepared and, when printed, will be available at the office of APC for $1.

The Manual of Classification, which is a more ready reference list than is the Index, may be had for $1.00 from the Chicago office of the APC or from the U. S. Patent Office, Washington, D. C. Another and more complete source of information on the subject matter covered by the patents and patent application is the Catalog, purchasable for $5; divisions of the catalog covering patents in a single classification cost only 10 cents and are obtainable from the Chicago office of the APC.

Copies of the patents and patent applications themselves can be purchased from the U. S. Patent Office, Washington, D. C., for 10 cents each in cash or money order but not in stamps.

Soon to be available are printed abstracts of as many as 7,500 of these patents and applications dealing with chemistry and chemical subjects. These abstracts have been prepared under the sponsorship of the Chicago Section of the American Chemical Society and are classified by field of interest. They are to be available from the Chicago office of APC for $1 per copy for each section or for $25 for complete sets of 33 sections, including master index, postage prepaid. Those in the food group, No. 18, the fermentation group, No. 19, and the fat and oils group, No. 20, are completed and are being mailed to fill advance orders. Mailing is expected to be complete by May 1. Current orders will be filled as quickly as possible from the APC Chicago office.

Applications for license use of any of the vested patents are to be had from the Office of Alien Property Custodian, Chicago 3, Ill., along with information pertaining to cost and operation under the license when obtained.

As a service to its readers, FOOD INDUSTRIES is bringing to your attention the following patents and applications in a digest manner, identifying them as clearly as possible with an interpretative title. When ordered for purchase, these patents should be ordered by number only, just as in ordering U. S. patents not held by the Alien Property Custodian. If more information concerning these patents is wanted from the Chicago office of APC, identify the patent by number and also by class.

Patents Granted

Glutamic Acid or Salts Used to Neutralize Acidity or Alkalinity of Hydrolized Proteins or Carbohydrates—Masao Fujii Toyotamagori, Japan. No. 1,680,865. Aug. 14, 1928. Class 99-16.

Bitter Taste Removed From Orange Peel by Fermentation—Heinrich Teusch, Essen, Germany. No. 1,813,366. July 7, 1931. Class 99-103.

Rising of Bread Dough Improved and Drying of Baked Loaf Retarded by Addition of Yeast-bacteria Culture Containing Lactic Acid Bacteria and Yeast Plants in Predetermined Ratio—Gabriel Török and Georg Becze, Budapest, Hungary. No. 1,894,135. Jan. 10, 1933. Class 99-91.

Carbonated Beverages of Low Alcoholic Content Made With Addition of Fermentation Inhibitor From Cranberries—Adolph Lewinson, Berlin-Charlottenburg, Germany. No. 1,899,512. Feb. 28, 1933. Class 99-44.

Butter, Lard and Similar Solid Fats Purified and Mixed Without Melting by Dividing Into Threads, Washing in Stream of Liquid, and Centrifuging; Bacterial Culture May Be Added to Impart Flavor—Richard Bendlin and Ottokar Urbasch, Vienna, Austria. No. 1,927,385. Sept. 19, 1933. Class 99-120.

Soy Beans and Similar Legumes Debittered by Dialyzing With Water at Pressure Above Atmospheric or Less Than Atmospheric and Temperatures Between 65 and 80 Deg. C.—Eyon Carl Wiökler and Hubert Coller, Vienna, Austria. No. 1,936,281. Nov. 21, 1933. Class 99-89.

Bread With Normal Sour Dough Aroma and Flavor Obtained by Adding Small Quantities of Low-molecular-weight Fatty Acid Along With Lactic Acid and Yeast—Ernst Komm, Dresden, Germany, to Theodore Schlüter. No. 1,974,028. Feb. 18, 1934. Class 99-90.

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Malt Enzymes Recovered From Beer Wort by Precipitation With Aluminum Silicate, Freed From Silicate by Weak Alkaline Extraction and Concentrated For Use in Baking, Textile Processing and Pharmaceuticals — Eberhard Heimann, Berlin-

Schoneberg, Germany. No. 2,163,200. June 20, 1939. Class 99-43.

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Margarine Stabilized for Moisture Content and Flavor Retention by Churning Fat Mixture With Malt Wort or Malt Extract and With Lecithin or Cholestrine—Bruno Behrend, Berlin, Germany. No. 1,944,962. Jan. 30, 1934. Class 99-123.

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Raw Vegetables or Fruits Ground Finely With Sugar, Without Rise in Temperature, and Concentrated to Desired Moisture Content at Room Temperature to Form Spread For Bread—Alfred Kuhn, Radebeul-Dresden, Germany. Serial No. 212,933. Class 99. Published May 4, 1943.

Albumen for Whipping and Baking Recovered From Milk by Adjusting to pH7 Without Heating, Dispersing With Alternating Electric Current, Filtering and Spray Drying—Karl Kremers, Stuttgart, Germany. Serial No. 257,240. Class 99. Published May 4, 1943.

Vitamins and Other Active Constituents Obtained From Plasmolyzed Yeast and Converted Into Dry Preparations by Addition of Sugar—Irwin Bumm, Koln-Mulheim, Germany. Serial No. 273,520. Class 99. Published May 4, 1943.

Baking Quality of Flour Improved by Addition of Ascorbic Acid in Pure State or Prepared From Fruits or Vegetables Activated by Very Small Quantities of Finely Divided Heavy Metals or Their Compounds—Pieter Reinier Antonius Maltha, Rotterdam, Netherlands. Serial No. 285,437. Class 99. Published June 1, 1943.

Solid Foods in Bulk Quantities From 100-lb. Can to Tank-car Lots Sterilized in Container by Direct Steam Treatment—Shigeru Shirokisawa, Tokyo, Japan. Serial No. 296,136. Class 99. Published May 4, 1943.

Baking Properties of Low-gluten Flour Improved by Addition of Gluten Obtained Through Removal of Starch From High-gluten Flour and Treating With Water-acid Solution Ranging Between pH 3 and 7—Joaham Ernst Nyrop, Hellerup, Copenhagen, Denmark. Serial No. 307,337. Class 99. Published May 4, 1943.

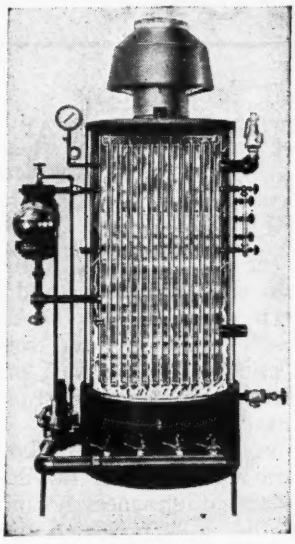
Vegetable or Fruit Pulp Waste Subjected to Controlled Hydrolysis With Acid, Alkali or Enzymes For Use as Emulsion Stabilizer—Waldemar Sklarz, Milan, Italy. Serial No. 332,396. Class 99. May 4, 1943.

Blood Plasma Prepared For Use as Substitute For Egg Albumen—Andreas Rugamer and Ernst Kunstmann, Hamburg, Germany. Serial No. 334,978. Class 99. Published May 4, 1943.

Canned Foods Protected Against Swelling by Addition of From 0.01 to 0.1 Percent of Sodium or Potassium Bromate or Iodine to Inhibit Growth of Anaerobic Microorganisms.—Holger Jørgensen, Copenhagen, Denmark. Serial No. 339,827. Class 99. Published May 4, 1943.

Fermentation of Bottled Fruit and Vegetable Juices Inhibited by Boiling Under Absolute Pressure of Approximately 5/32 In. of Mercury to Remove Oxygen Content Prior to Filling Into Containers and Sealing—Ernest Léon Victor Emile Lizeray, Paris, France. Serial No. 352,622. Class 99. Published May 4, 1943.

Bottled or Canned Milk Deterioration Inhibited by Replacing Oxygen-containing Air in Container Before or After Filling With CO_2 or Ammonia Gas Which Will Be Dissolved after Sealing to Create a Partial Vacuum in Finished State—Adolph Bargeboer, The Hague, Netherlands. Serial No. 358,093. Class 99. Published May 4, 1943.



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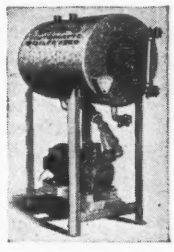

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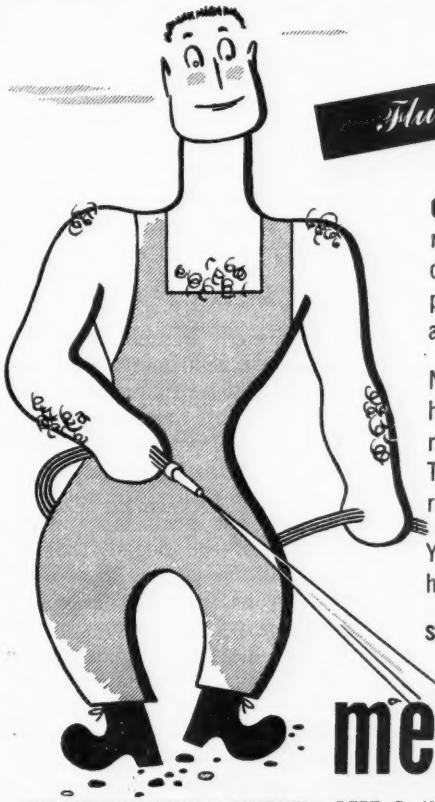

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BOOKS

Wheat Technology

CONSTITUENTS OF WHEAT AND WHEAT PRODUCTS, by C. H. Bailey. Published by Reinhold Publishing Corp., 330 West 42nd St., New York, N. Y., 1944. 332 pp.; 6x9 in.; cloth. Price, $6.50.

One of the American Chemical Society's series of scientific and technologic monographs, this book is a compilation of the significant facts and data relating to the substance present in wheat and in its various structures and milled products.

It is not written as a handbook of analytical methods. But the descriptions of certain substances, notably the proteins, had to be presented in terms of the methods used and their fractionation, recovery and purification.

In some sections, dynamic biochemical considerations are utilized in characterizing such substances in terms of their behavior when hydrolyzed by enzymes.

Consideration is given only to materials and substances present in natural wheat, and there are no references to flour bleaching and maturing agents, flour improvers, malt or malted wheat flour, flour enriching ingredients, and the like.

The book is sufficiently complete in its treatment of the various subjects that the technologist will not have to refer much to the literature. The author is a well-known authority on the subject covered.

The Baruch Report

REPORT ON WAR AND POST WAR ADJUSTMENT POLICIES. By Bernard M. Baruch and John M. Hancock. Published by the Office of War Mobilization, Washington, D. C., 1944.

The famed "Baruch Report" is important in that it points the trend that probably will be followed by the government in the postwar business adjustments. The conservative and hopeful tone of the whole report is embodied in two early paragraphs:

"There has been too much loose parroting of the slogan, that if individual enterprise fails to provide jobs for everyone, it must be replaced by some one of the other systems that are around. The war has been a crucible for all of the economic systems of the world, for our own, for Communism, Fascism, Naziism, all the others. And the American system has outproduced the world.

"America's productive capacity can perform still another miracle in a fine and lasting peace. It will not do so if pressure groups are permitted to turn that capacity into a battleground for their own selfish interests or inflate ourselves out of the world market."

While the adjustment from a war to a peacetime economy is not claimed to be easy, the report outlines how it can be done by giving consideration now to such plans as getting us all back to work in peacetime enterprises, by provision of credit, by reduction of taxes, and so on.

Extensive treatment is given to three of the subjects, contract termination, surplus property and tightening of the industrial war machine, in a separate section following the report itself.

Cooking Dehydrated Food

COOKING DEHYDRATED FOODS. Published by the U. S. War Department. Washington, D. C., as TM 10-406. 73 pages; 6x9 in.; paper. Price, 15 cents.

Food dehydration has expanded so rapidly since the beginning of the war that those charged with the cooking of these foods have been unable to keep up. While this manual is prepared for Army mess officers and cooks, it is of value to dehydrators who must tell their customers how to get the best results in preparing the food for the table.

The book gives detailed instructions on how to restore the various vegetables, fruits, eggs and meats. After the food has been rehydrated, its preparation and cooking are discussed at length.

A milk substitution table, reconstitution ratios of several dehydrated foods and a table of weights and measures, expressed in terms of quart dipper and mess kit spoon, are included in the appendix.

Food Statistics

AGRICULTURAL STATISTICS 1943. Published by The U. S. Department of Agriculture, Washington, D. C., 1943. 548 pages; 6x9 in.; paper. Price, 65 cents.

As in past years, this volume brings together important statistics compiled by the Department of Agriculture. Because of wartime restrictions, the book is smaller than usual. The statistical tables, for instance, are limited to data beginning with 1929 or 1930, or to the most recent ten years. Earlier statistics are available in the 1942 edition of the book.

Monthly statistics are omitted, as are tabulations on international trade and most figures on imports and exports.

Vegetable Salting

(Continued from page 74)

Most of the vegetables now being salted will undoubtedly be used for soup, where they will be mixed with meat stock, tomatoes, celery, cabbage and turnips, and seasoned to taste. The acidity of the tomatoes and the other flavors present will enhance the flavor of the salted vegetables. This is a very excellent way to use salted vegetables, since the soup maker is either knowingly or unknowingly adding to the salted vegetables the materials which have been withdrawn during salting.

On such uses depends the future of salted vegetables. The application of machinery and modern methods of salting have enabled the industry to preserve millions of pounds of vegetables satisfactorily at a very low cost. There is no question but that the knowledge and experience gained during the war period in salting vegetables at such a low cost will carry over in many instances into peacetime.

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Pressure Cooling

(Continued from page 69)

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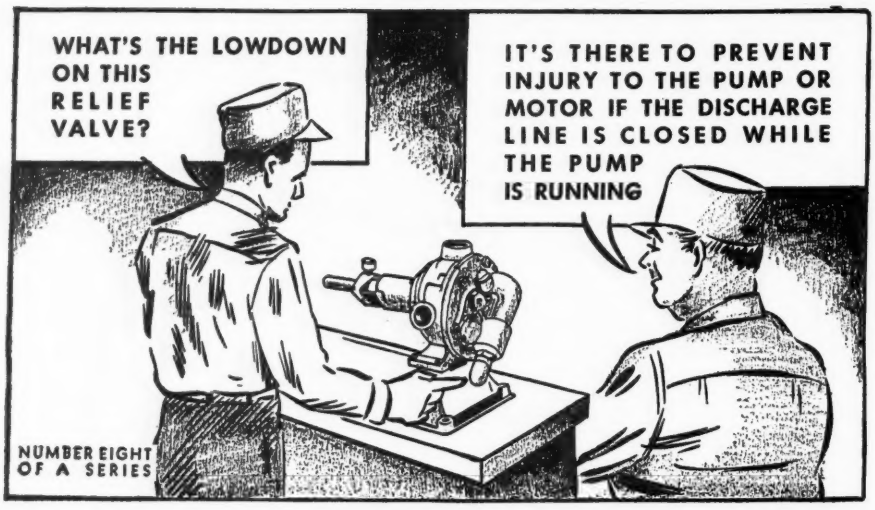
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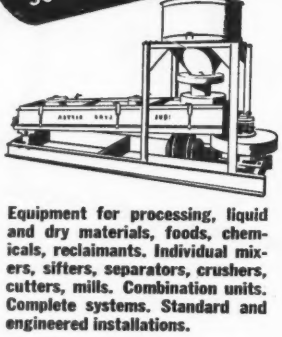

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Vacuum Sealing

(*Continued from page 92*)

the stability of the vitamin. It had been hoped that the actual weight of the vitamin lost by the fortified milk would not be much greater than in the case of the unfortified product, in which eventuality the sealing under nitrogen or vacuum might have been dispensed with from a practical standpoint without undue loss.

After disposing of the disappointing aspects of the results, there is still considerable to be said in favor of the fortification of evaporated milk with vitamin C if the air of the can is removed at the time of sealing. Curves 4 and 5 disclose that there is no significant difference in the results obtained by nitrogen as compared with vacuum sealing. They also indicate that average milk fortified with 50 mg. per liter of ascorbic acid, and sealed without oxygen, undergoes only a slow depletion of the vitamin during storage. In the study reported, there are still in excess of 45 mg. per liter of ascorbic acid present after 6 months of storage. This is equivalent to more than 34.7 mg. per 14½-oz. can, well over the *recommended* daily allowance for young infants and more than three times the daily *requirement*. Furthermore, there is every indication that the rate of loss after 6 months becomes insignificant, although sufficient data to substantiate this are not available at present.

Retention of Vitamin C After Opening

The milk samples from a large number of cans cut for analysis in this study were held in an ordinary refrigerator and analyzed again after 3 days and 7 days. Some of them were reconstituted and held in glass while others were held in the concentrated form in the original can, two holes having been punched for the removal of the first sample. The average stability of the ascorbic acid in evaporated milk after opening the can, under these conditions, is summarized in the table. The advantages of sealing in the absence of air are carried over, even after opening the can, and the vitamin is less easily destroyed, whether the milk is held in glass or the original can. The samples held in

cans showed definitely less loss than those in glass, as might be expected. It is interesting to note that the 6-month old fortified milk, sealed without air, 7 days after opening, when held in the can, still contained on an average 33.65 mg. per liter of ascorbic acid or 26 mg. per can.

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Facts About Packaging

(*Continued from page 90*)

at this temperature the product had become essentially inedible and almost black in color. Storage at 98 deg. F. had the same general effect. After 6 months at this temperature, the product was not very attractive or palatable. At ordinary room temperature the product was in good condition after 6 months and still acceptable after one year. Storage at elevated temperatures also adversely affected the extent to which the product would reconstitute. The drained weights of product stored at 98 deg. F. were lower than those stored at 75-80 deg. F. At 130 deg. F. the effect was even more marked.

The pH of the cooking liquors was lowered by storage at high temperatures. Within 3 months, the pH on samples stored at 130 deg. F. had been lowered from approximately 5.3 to 4.5. Changes in this respect on storage at 98 deg. F. and 75 to 80 deg. F. were less marked. After 3 months at 130 deg. F., only about 50 percent of the original carotene content remained, even in the gas-packed packages. However, at 98 deg. F. and 75-80 deg. F. most of the carotene was retained in the gas-packed product through one year's storage.

Storage temperature had an appreciable effect on the retention of thiamine. The product stored at 130 deg. F. retained only about one-third of its initial thiamine content after 2 months while that stored at 98 deg. F. retained about 50 percent of its initial amount after 6 months, with no apparent change after that. In comparison, storage at 75-80 deg. F. had little effect.

There was no significant change in the riboflavin content of the samples under any of the conditions of the tests.

Large amounts of CO_2 were given off by the product stored at elevated temperatures, gradually building up a

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YEARLY FOOD ORDER:
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BILLION
POUNDS!

Booster Conveyor which is easily adjusted to accommodate cartons of various widths. Strietmann Biscuit Co.

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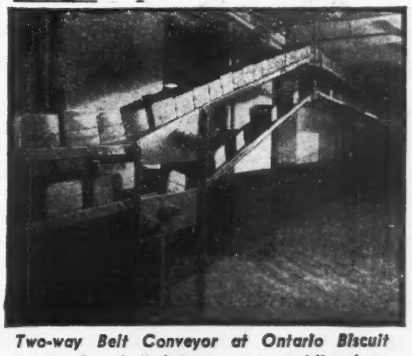
● Lamson offers you "The Shortest Road to Profit in the Food Market," and other pamphlets showing Lamson conveyors at work. Write for them. Or, if you have a specific problem, let Lamson engineers help. No charge or obligation is involved.

Filled bags are moved from the filling and weighing operations through the stitchers by this Lamson Belt Conveyor at Russell Miller Milling Co.



Two-way Belt Conveyor at Ontario Biscuit Plant. Top belt brings empty caddies from floor above. Lower belt takes filled caddies to shipping or storage.

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pressure in the cans. The air-packed cans stored at 130 deg. F. contained as much as 60 percent CO_2 and 2 months.

The effect at the other storage temperatures was less marked, although 30 percent CO_2 was found in the air-packed can stored at 98 deg. F. for one year. At 75 to 80 deg. F., the air-packed cans showed a CO_2 content of 11 percent after a year.

3. Effect of Lower Moisture Content—This moisture content was only slightly lower than that indicated as regular. In general, there was little difference in the quality of the samples at the two moisture levels. If anything, the dehydrated carrots of lower moisture content seemed slightly better in general quality at the later examinations.

Discussion of Results

1. As indicated in the body of this report, the moisture content of the carrots before they were taken to Geneva, N. Y., for packaging was found to be 5 percent. After the packed samples were received in Chicago, however, the moisture content was found to be 5.6 percent. There are two possible explanations for the difference. Either the carrots absorbed this additional moisture during packing or the technic of making the moisture determinations varied enough to account for the difference. We do not believe that the product absorbed much moisture during packing because it is not particularly hygroscopic and was handled very rapidly. There was some variation in moisture determination technic, however. The first determination was made by the regular vacuum-oven method (70-deg. C. oven at 100-mm. Hg pressure or less for 6 hours), using a sample ground in a Wiley mill through a 2-mm screen. Our determination was made using the technic outlined in the "Statement of Problem and General Procedure." The difference in fineness of grinding is slight but it has been our experience that very small differences in grinding can account for large differences in apparent moisture content in the vacuum-oven method.

2. The increase in apparent moisture content of the samples stored at 98 deg. F. and hermetically sealed in cans was probably due to chemical decomposition in the product as discussed in the report of storage tests on powdered dehydrated cranberries (FOOD INDUSTRIES, April, page 77).

3. As indicated in the Summary of Results, the moisture absorbed by the product packed in the paper containers and stored at 98 deg. F. and 93 percent relative humidity had no apparent effect on quality which could be at-

tributed to increase in moisture content only. This was surprising in view of the generally accepted principle that higher moisture contents reduce the storage life of dehydrated foods. This effect should have been most noticeable at the later examinations, but by that time deterioration due to other causes probably covered it up.

4. The apparent increase in riboflavin content on storage of the samples was probably due to the production of compounds which also stimulate the growth of the organism used to measure the riboflavin microbiologically. This same phenomenon was observed in the course of our storage studies on dehydrated apple nuggets.

Blueprint of Success

(*Continued from page 65*)

troughs and carefully looked over before going to the cooking kettles. Frozen fruits, like blueberries, were, at one time, a source of foreign materials, such as small stones, leaves, twigs and nails from the boxes in which they were packed. This has been largely overcome by passing the berries over a tilted inspection screen to separate the leaves, twigs and stones and then over a magnetic separator to remove the nails. Cleanliness and a program of continual vermin control are the precautions taken against the accidental presence of roaches, mice, or parts of these, in the baked cake. Finally, on the theory that despite these measures some foreign materials may have gotten into the batter, all batters are screened in the depositor itself just before they are placed in the baking pan.

Continuous Pie Production

Multiple-unit pie pans travel by conveyor belt under a dough sheeter which extrudes a continuous ribbon of dough the width of the pan. This sheet of dough constitutes the bottom crust of the pie-to-be. Farther along the belt, the pan passes beneath the filling depositor which drops the required amount of filling into each unit of the pie pan. A little farther on, another sheeter extrudes a ribbon of dough which is the top crust of the pie. After the top crust is sheeted on, the surface is dusted with flour as the pan travels along the belt. Then the sealing rollers press top and bottom crusts firmly together around the edges to prevent the filling from escaping during baking and also to make sure that the pies will separate easily when they are dumped from the pan after they have been baked. After sealing, the excess dough along the edges of the pan is removed by a scraping edge

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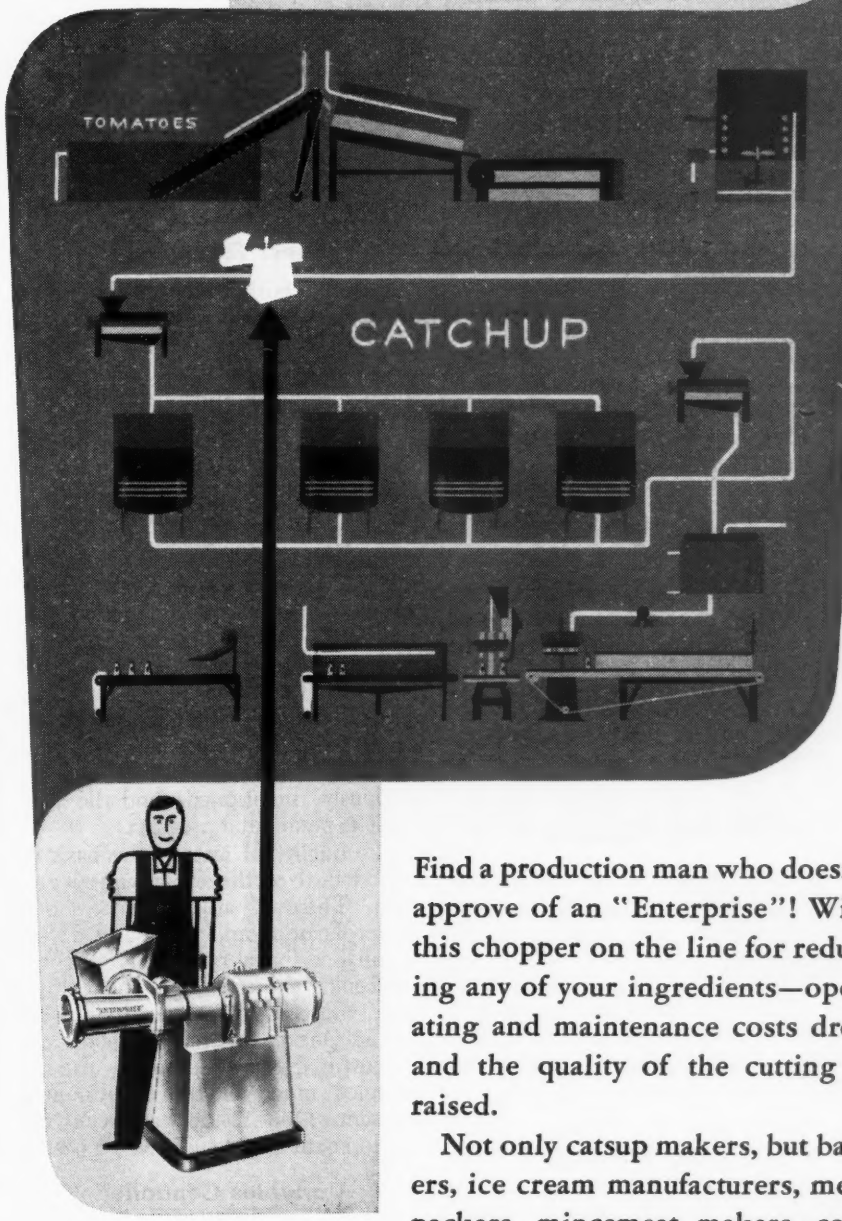

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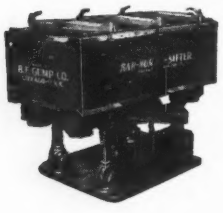

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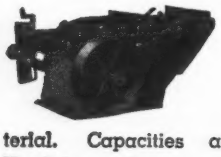

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set on the track. The excess flour is blown off and a milk-egg mixture is sprayed on to produce a good crust color in baking. The operation is almost entirely mechanical from the time the empty pans are fed into the machine until they reach the oven.

One of the two partners in the company expressed a basic tenet of production policy somewhat as follows: "Let me have the chocolate cake and apple pie business and I don't care who does the rest of the baking." Today the total number of cake and pie varieties produced by the company is around 20, and the bulk of the sales volume is concentrated in not more than half a dozen items.

Super Formulas?

There is a fairly wide-spread opinion in the industry that these products are largely the result of some secret "super-duper" formulas. Although the company codes its formulas, and it is the policy to prevent the details of processing from becoming known to employees, the super-duper angle has been considerably overstressed.

The prosaic truth is that the formulas have been evolved over a period of time by a well-developed, intensively pursued, experimental production program and by increasing the control of variables. The same habit of methodical thought and careful recording of data, the same mental quirk that sees an old problem in a new light, and the same "scientific method" outlook previously mentioned underlie the whole experimental program.

The quality of taste is the basis of a good deal of the experimental program. There is an insistence upon proper flavoring and the use of flavors to enhance appeal rather than to cover the cook's shortcomings. In that respect, the company makes its bow to the old Quaker tradition of good food. Improving the keeping quality also has occupied much of the experimental program. One result has been the development of pressure-cooked pastes.

Variables Controlled

The control of production variables, such as batter density, has already been mentioned. Six traveling ovens, electrically heated, provide close control over baking temperatures. Where low temperatures are required, as in the mixing of cup cake batter, pie dough or pretzel dough, the products are mixed in refrigerated rooms. High-temperature batters, such as sponge, are adjusted by controlling the temperature of milk and eggs added to the batch. Where the baked cake has to stand while cooling and is waiting to be transferred to the wrapping belts, the humidity in that area is held at such a point that the moisture does not evaporate too rapidly from the cake. Temperatures and densities are important and controlled factors in the manufacture of icings and fillings. The drying rate of some icings after being put on the cake, but before wrapping, has to be controlled to prevent them from sticking to the wrapper. The key to this has turned out to be the temperature of the icing at the time it is applied to the cake.

Another important part in the control of variables, and often neglected in the average baking plant, is centered in the purchasing agent's office. All raw materials are bought according to a strict standard. The production department knows, therefore, with what it will have to work.

The Taste Is the Test

The tasting program of the company can be called the last control in production. It is certainly the test against which everything else must be measured. Tasting samples of the products is part of the daily plant routine, not only in the production office, but also in the control laboratory and the executive office as well. The company heads feel that it is simple, elementary horse sense to know what the foods they make taste like. That is the way the customer judges the product, isn't it?

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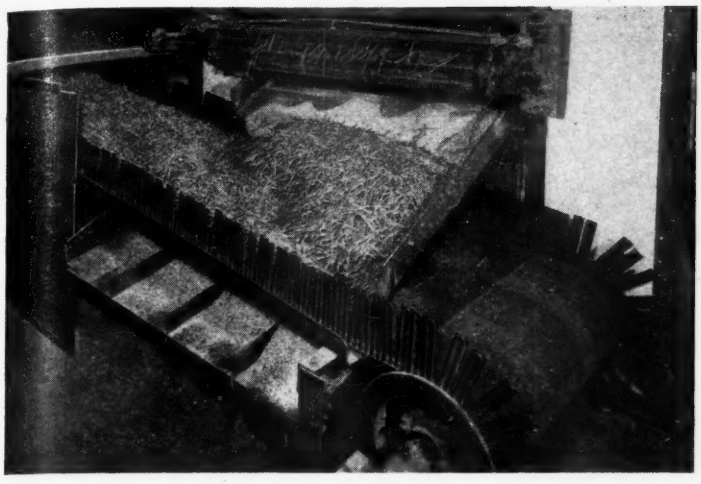
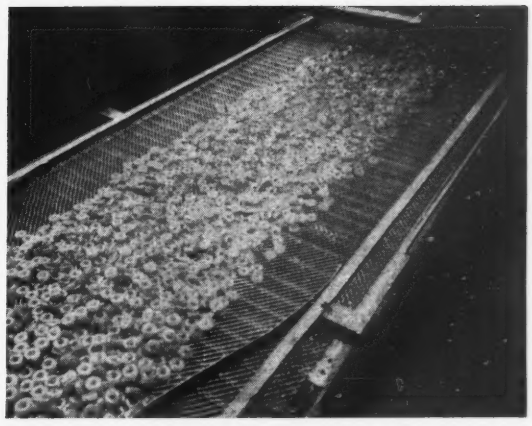
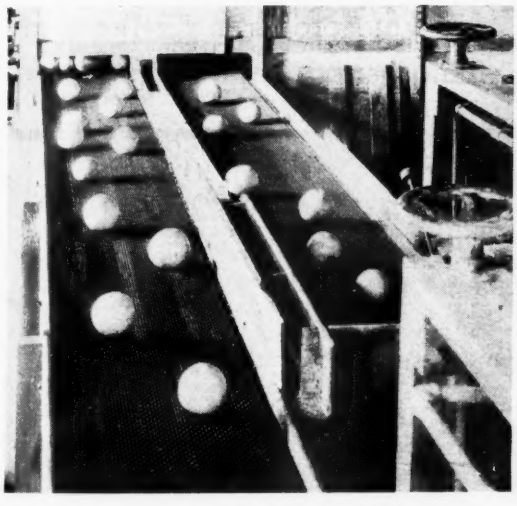


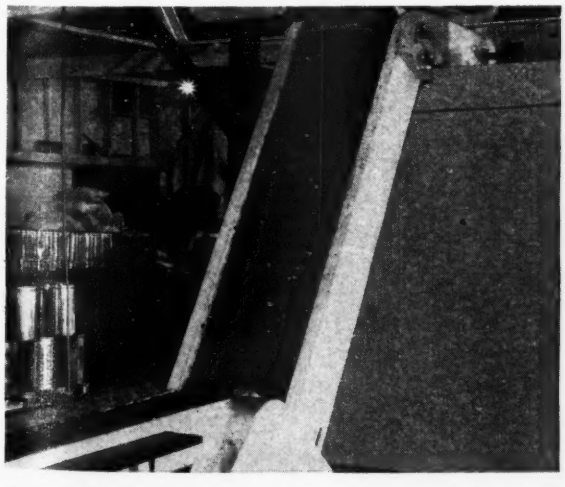
Bakery installation showing Pretzel Sticks being transferred from oven to dryer belt



A Cambridge Conveyor Belt used for cooling candy life savers.



In the sorting and packing operation, grapefruit are carried on a Cambridge Conveyor Belt.



A quick freezing unit for handling strawberries, peaches, peas, etc.

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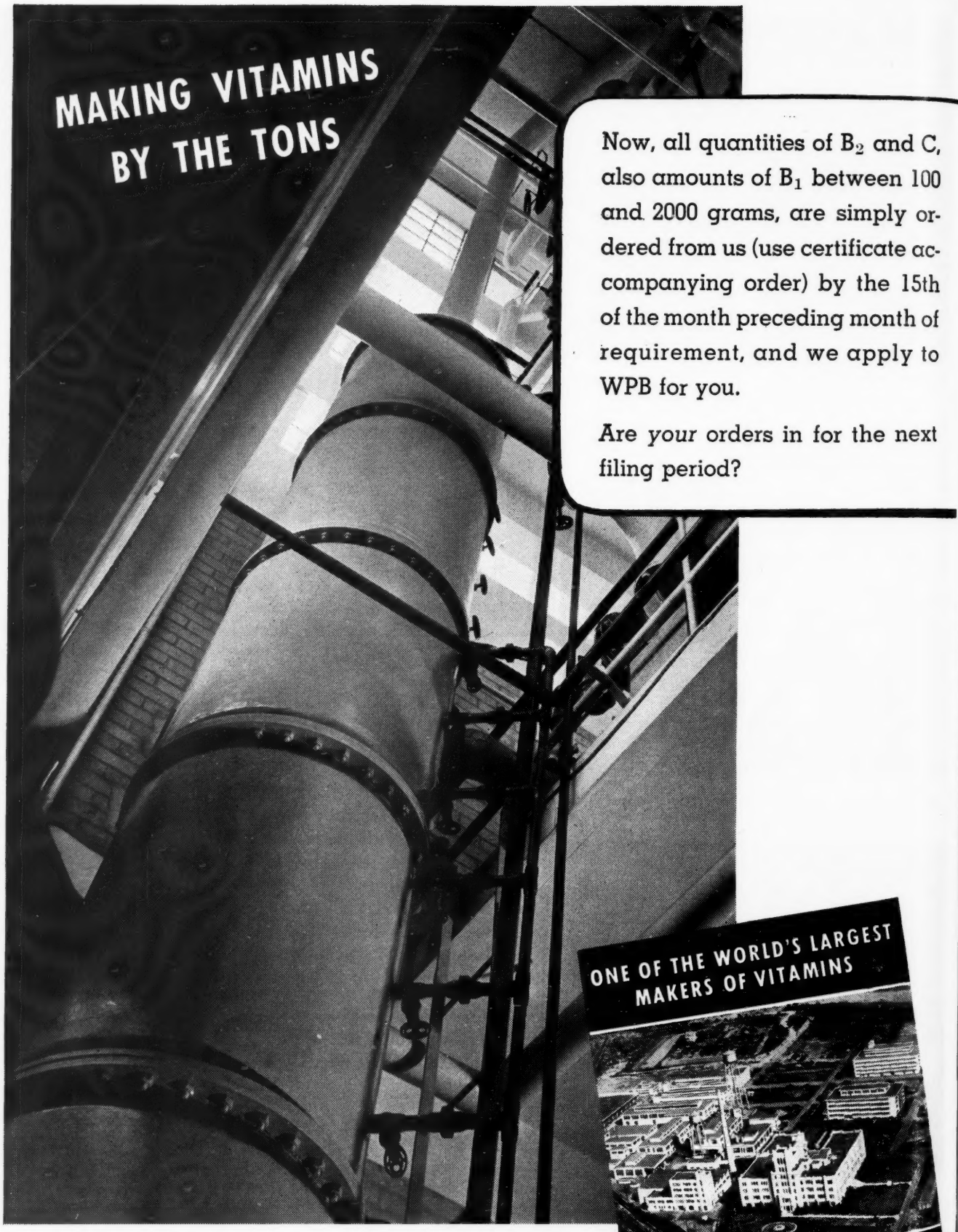

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FOOD TECHNOLOGY
NEW DISCOVERIES AND INVENTIONS

PACKAGING

Refrigerated Fish Box

FRESH fish fillets can be shipped for as long as four days in cars having a temperature range up to 75 deg. F., and two days at outside temperatures up to 90 deg. F., by use of dry ice blocks in a corrugated paperboard container having special thermal insulating pads. Rates of heat transfer are calculated in the design of the shipping unit, and loading of the boxes is arranged so that the temperature of the fresh fillets remains in the desired range, without freezing at the start of the shipping period.

The shipping unit holds two 20-lb. packages of fillets. "Merkle" insulation pads are used to line the shipping container and to regulate the rate of heat transfer between the fillet boxes and the refrigerating unit containing dry ice which is placed between them. The fish are precooled to 38 to 40 deg. F. before packing. After the complete unit is assembled it is sealed with heavy gummed tape.

In the unit developed by the Fish and Wildlife Service, the outside shipping case measures approximately 23 by 12 by 12½ in. and is supplied with 28 to 34 lb. of dry ice. The fillet boxes, holding 20 lb. each, are 21¼ by 10¼ by 2¾ in. The refrigerating unit, placed between them, is 21 9/16 by 10⅜ by 4 in. These relative dimensions provide suitable air spaces and room for the insulating pads.

Digest from "Dry Ice Refrigeration of Fresh Fish Fillets," by E. F. Kapalka and R. H. Flowers, *Fishery Market News*, August, 1943.

STARCH PRODUCTS

Potato Starch

FACTORS influencing consistency of potato starch pastes include the method of drying and the presence of water-soluble materials.

Exposure to dry heat, even at 194 deg. F., lowers the maximum consistency. Heating the air-dried product at 212 and 230 deg. F. decreases the maximum consistency with time of exposure up to 80 hours, which was the longest period used. Further experiments indicated that the effect is due to the heat used in drying and suggested a very slow change similar to dextrinization. Drying of wet starch to the air-dry moisture range (about 13 to 16 percent) does not cause loss in consistency.

Water-soluble material developed during the dry heating does not affect the consistency, electrolytes introduced by using tap water in processing have a marked lowering effect.

Other factors influence the maximum consistency of the paste and the temperature at which it occurs, but on any sample two criteria indicating previous treatment are of interest. Clean, undegraded potato starch should have a high peak consistency at a temperature below the boiling point of the starch paste, the temperature of the maximum consistency being lower the less the heat-degradation. Increase in the maximum consistency through washing with distilled water indicates contamination with electrolytes in processing.

Particle-size distribution differs with the method of processing and the origin of the starch, but no correlation could be found with the consistency.

Digest from "White Potato Starches," by P. E. Meiss, R. H. Treadway and L. T. Smith, *Industrial and Engineering Chemistry*, vol. 36, 159-63, February, 1944.

STORAGE

CO_2 in Ripening Bananas

CARBON DIOXIDE is reported to affect the rate of ripening and the rate of development of vitamin C in bananas, but not the ultimate vitamin C content of the ripe fruit.

In making these experiments it was found that normal sulphuric acid must be used to extract the ascorbic acid, lower concentrations or weaker acids giving lower results even after hydrogen sulphide reduction. With the concentrated acid, the ascorbic acid determinations were consistent and reproducible.

The green bananas as received from the steamship usually contain 13 to 15 mg. of ascorbic acid per 100 g. of pulp tissue. During normal ripening at about 66 deg. F., the ascorbic acid increases slightly, then falls to about 10 to 12 mg. per 100 g. with complete yellowing. After more than 50 percent of the peel has become brown and the pulp has softened, there is a further gradual decrease, down to 7.7 mg., with completely blackened peel and a strong fermented odor.

Exposure of the green bananas to CO_2 in various concentrations caused a loss of ascorbic acid, greater with increased concentrations of CO_2, but by the time the brown-peel stage was reached the ascorbic acid approached that of normally ripened fruit at the same stage. Return of the bananas to normal atmosphere at any point in the ripening resulted in rapid return of the ascorbic acid content to that of normally ripened fruit at the same stage. High concentrations of CO_2 do cause an increase in the pH of the banana tissue, amounting to from 0.2 to 0.5 pH over the control fruit, and the starch grains of the bananas treated with CO_2 decompose into a soluble mass without showing the etching characteristic of grains during normal breakdown, indicating that some changes do take place in the fruit.

Variations of oxygen concentration from 0 to 100 percent, the presence of ethylene concentrations between 1 to 8,000 and 1 to 500 parts of air, or various concentrations of hydrogen cyanide had no detrimental effect on the ascorbic acid content of the bananas.

Digest from "Carbon Dioxide Storage—XIV. The Influence of Carbon Dioxide, Oxygen, and Ethylene on the Vitamin C Content of Ripening Bananas," by N. C. Thornton, *Contributions of the Boyce Thompson Institute*, vol. 13, 201-20, October-December, 1943.

DAIRY PRODUCTS

Milk Control Program

SINCE the first of January, 1943, standard plate-count tests and coliform tests have been discarded for all milk in the Rockford, Ill., milk shed. A program based on sediment tests, direct microscopic tests of incoming raw milk and pasteurized milk, and phosphatase tests and swab tests of cleaned equipment has been substituted with satisfactory results. The program involves tests of the quality of the milk, control measures on equipment and operation, and an information service to assure cooperation of the milk producers.

On the raw milk, the odor, temperature and appearance of each can of incoming milk is noted by the weighman at the receiving plant, and any cans

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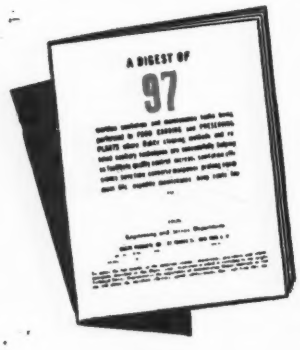

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which give indication of being below standard are set aside for test. Sediment tests are run weekly and direct microscopic tests monthly. Each batch of pasteurized milk undergoes phosphatase tests, with weekly direct microscopic examination and butter fat determinations.

Cleanliness of equipment is assured by monthly direct swab tests, weekly chemical examination of cleaning solutions, and periodic inspections of cleaning, washing and equipment storage operations. Proper operation is further guaranteed by temperature-chart and thermometer checks for each batch pasteurized and periodic rechecks by the city milk sanitarian.

Cooperation of the milk producers is obtained through monthly "narrative reports" to distributors and producers associations, follow-ups and notices regarding rejected or below-grade milk, and semiannual farm inspections. Direct microscopic plates are shown to the pasteurizing-plant operators when they help to indicate sources of difficulty.

Standard plate counts are considered time consuming and misleading. Direct microscopic test results aid in directing attention to possible sources of contamination which affect taste, odor and consistency of milk, according to those responsible for the use of this milk control plan.

Digest from "Applying the Direct Microscopic and Swab Tests in a Milk Control Program," by N. O. Gunderson and C. W. Anderson, *Journal of Milk Technology*, vol. 7, 73-77, 110, March-April, 1944.

CANNED FOODS

Preserving Cherries

A PATENT has been issued which covers the incorporation of sugar into preserved fruit, particularly cherries, by osmotic action in the temperature range from 0 to 32 deg. F. It is stated that fruit preserved in this way retains its natural color, texture and flavor.

According to the patentee, the fruit is cleaned and prepared as usual, then placed in a suitable container. Sugar is added in the proportions of 60 to 150 percent of the weight of fruit, depending on the sweetness desired. With the lower content of sugar, sodium benzoate is also added, up to1/15 of 1 percent.

The container is hermetically sealed and stored at a temperature between 0 and 32 deg. F. until the sugar in the fruit and in the juice is equalized—about 4 weeks. During this time, the container must be turned over or shaken occasionally to insure even distribution of the sugar.

The fruit in the containers must be

heated immediately after removal from cold storage, in order to prevent enzymic deterioration. Without this heating, to 140 to 185 deg. F., the fruit becomes very bitter after removal from cold storage. It is claimed, however, that heating at this point makes no noticeable change in the cellular structure, color or flavor of the fruit.

It is recommended that the air be exhausted from the container when it is first filled, to prevent development during heating of a pressure which will break down the cellular structure of the fruit.

After heating, the sealed containers may be stored at room temperature for an indefinite period without loss of quality.

Digest from U. S. Patent 2,340,145, issued Jan. 25, 1944, to A. J. Rogers, Beulah, Mich.

FATS AND OILS

Fatty Acids of Lecithin

RELATIVELY pure lecithin (97 percent) was separated from crude soybean phosphatides by repeated purification steps, including precipitation with cadmium chloride and a technic of solution and washing with nonaqueous solutions so as to avoid the formation of emulsions.

The percent of fatty acids found is reported below, together with those in soybean glycerides as reported from the literature:

Fatty acid	Lecithin	Glycerides
Palmitic	15.77	6.8—14.3
Stearic	6.30	2.4— 5.5
Arachidic	...	0.3— 0.9
Oleic	12.98	25.9—33.7
Linoleic	62.92	50.7—58.8
Linolenic	2.02	2.1— 6.5

Digest from "The Component Fatty Acids of Soybean Lecithin," by M. H. Thornton, C. S. Johnson and M. A. Ewan, *Oil & Soap*, vol. 21, 85-87, March, 1944.

DEHYDRATION

Palatability Tests

THREE commercially dehydrated vegetables—cabbage, beets and rutabagas—were studied for the effect of cooking conditions and storage on palatability.

In all cases, soaking before cooking decreased the flavor and firmness of texture, and it also decreased the color except in the case of cabbage. Soaking before cooking should be avoided.

In storage for five months, variations in temperature brought about more noticeable changes than did differences in packing. Unblanched dehydrated cabbage was affected the most by methods of storage. Samples held at −40 deg. F. and at 33 deg. F. were usually good, but those held at

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57 and 75 deg. F. acquired a brown color and lost flavor. Beets were stored at ordinary temperatures without loss of palatability.

Digest from "Palatability Studies of Commercially Dehydrated Vegetables," by F. Fenton and H. Grifft, *Food Research*, vol. 8, 364-76, September-October, 1943.

SUGARS

Apple Sirup

THE Eastern Regional Research Laboratory has issued a revised mimeographed circular for the preparation of bland sirup from apples. The original instructions were condensed in FOOD INDUSTRIES for December, 1942.

The new report includes refinements in processing methods developed as a result of further experience, and details of commercial costs.

The composition of the apple sirup at 75 percent total solids, determined by a refractometer, is reported as 10 percent nonsugar solids, 2.59 percent ash and 0.48 percent calcium oxide, with 65 percent of sugars made up of 37 percent levulose, 14 percent dextrose and 14 percent sucrose.

In selecting apples for processing, those with high solids content are desirable. Acidity of 0.6 percent or higher should be avoided, as that may lead to precipitation of calcium malate which requires extra treatment. The calcium malate is thought to be responsible for a slight bitter after-taste in the otherwise very sweet and bland sirup.

When the sirup is to be used for tobacco, the juice may be preserved in wooden tanks for later processing by adding 0.1 percent by weight of sodium benzoate or 500 to 1,000 parts per million of sulphur dioxide. SO_2 must be eliminated before liming by heating and blowing with air.

Lead is removed in part by liming and filtration, but arsenic does not seem to be reduced. Hence the precautions in washing to remove spray residues must be carefully observed. Present tolerances are 0.05 grain of lead per pound and 0.025 grains of arsenic trioxide per pound. Arsenic can be removed by a suitable ion exchanger, as shown in the table. Calcium can be so removed when desired.

In addition to its well-established use in the tobacco industry as a moisture regulating agent and sweetener, the apple sirup is finding application in ice cream, sherbets, ices, pastry, candy, table sirups, sugar curing of hams and in non-food processing. It has interesting possibilities as a modifier of milk because of its effect on curd tension.

When a more viscous sirup is desired, the natural pectin in the fresh juice may be retained in the product. Sirups of this sort have been prepared on a laboratory scale.

Digest from "Bland Apple Sirup" by H. H. Mottern and R. H. Morris 3rd, Mimeograph Circular AIC-37, Eastern Regional Research Laboratory, Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture, issued in January, 1944.

Metallic Residues in Apple Sirup

Description	Lead, grains per pound	Arsenic trioxide, grains per pound	Copper, parts per million
Laboratory sample prepared in stainless steel equipment	0.001	0.001	1.5
Commercial sample prepared in copper equipment with soldered joints	0.005	0.022	2.4
Commercial sample from peels and cores			
As processed	0.031	0.055	..
After passage through suitable ion exchanger	....	0.007	..
After passage through less effective ion exchanger	....	0.047	..
Pear sirup prepared in previously idle copper equipment	0.001	0.015	73

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FORMULAS FOR FOODS

FORMULA NO. 464

Sugar Wafers

Sugar	29 lb. 8 oz.
Cake oleomargarine	18 lb. 12 oz.
Shortening	18 lb. 8 oz.
Salt	10 oz.
Bicarbonate of ammonia	1½ oz.
Soda	1¾ oz.
Whole eggs	6 lb. 10 oz.
Vanilla extract	6 oz.
Cake flour	56 lb. 8 oz.

Directions

Cream together the sugar, shortening, oleomargarine, soda, ammonia, vanilla and salt until light. Add the eggs about one-quarter at a time. Add the flour and fold in.

Run on a wire-cut cookie machine, using a 5-hole die. Scale 5 oz. to the dozen, making about 400 dozen from this amount.

Bake at about 400 deg. F.

Formula from P. C. T Ewert, Excelsior Baking Co., through American Society of Bakery Engineers.

FORMULA NO. 465

Liver Sausage

Hog livers	50 lb.
Pork belly trimmings	15 lb.
Pork cheeks or neck trimmings	35 lb.
Dry milk solids	3 lb. 8 oz.
Salt	3 lb.
Invert sugar	3 oz.
Onions	4 lb.
White pepper	6 oz.
Sweet marjoram	1½ oz.
Mace or nutmeg	2 oz.
Ginger	1½ oz.

Directions

Livers must be fresh and clean. Run the livers and the freshly peeled onions through a 1/8-in. plate, then place in the silent cutter and chop fine. Run the cheek and belly trimmings through a ⅛-in. plate and add to the liver in the silent cutter. Add the salt, sugar, milk solids and spices. Chop until fine and thoroughly mixed.

Stuff into hog bungs. Cook at 165 deg. F. until the inside temperature reaches 150 deg. F., then reduce the temperature to 160 deg. F. and cook 30 min.

Chill quickly. Hang up to dry.

If smoked liver sausage is desired, hang the sausage in the smokehouse after it is dry and smoke at a low temperature until the desired color is attained. Care must be taken so that the temperature will not get high enough to make the sausage drip. If this happens, the product will look streaked and the shrinkage will be considerable.

Formula from American Dry Milk Institute.

FORMULA NO. 466

Orange Jelly Paste

Granulated sugar	20 lb.
Corn sirup	55 lb.
Standardized invert sugar	25 lb.
Corn starch, 50–60 fluidity	12 lb.
Water	130 lb.
Cream of tartar	3 oz.
Orange - peel marmalade (Formula 424)	15 lb.
Orange color	as desired

Directions

Place all of the above materials, except the orange-peel marmalade and color, in a kettle, mix well; and gradually bring to the boiling point. Cook slowly to a heavy jelly.

Add the orange-peel marmalade and color and mix thoroughly.

Pour the batch into trays lined with heavy wrapping paper, sifting a mixture of 8 parts of cornstarch and 2 parts of powdered sugar over the surface. Allow the jelly to set for 3 days or longer, then cut into bars, small squares or oblongs and roll in the powdered sugar and cornstarch mixture. Allow to set several hours before packing or coating.

The orange-peel marmalade is made by boiling together (to 222 deg. F.) of 6 lb. of orange peel and pulp (ground), 15 lb. of water and 10 lb. each of corn sirup and standardized invert sugar. After cooling, the mixture can be ground finer for use in candies.

Formula from The Nulomoline Co.

FORMULA NO. 467

Raisin Doughnuts

Milk	2 qt.
Shortening	1 lb.
Yeast	1 lb.
Egg yolk	1 pt.
Seedless raisins	7 lb.
Sugar	2 lb.
Salt	3 oz.
Hard wheat flour	9 lb.
Flavoring	to taste

Directions

Dissolve the yeast in some of the milk. Put the sugar, egg yolk, flavoring, shortening and the remainder of the milk in the mixer and stir to dissolve the ingredients. Then add the flour and the yeast and work to a smooth dough. Let ferment 1½ hours.

Put back into the mixer and incorporate the raisins. Ferment again ¾ hour. Divide the dough at the end of this fermenting time.

Fry the doughnuts in fat at about 360 deg. F.

Formula from Sun-Maid Raisin Growers Association.

FORMULA NO. 468

Boiled Icing or Base Wartime Formula

Egg whites	8 lb.
Salt	2¾ oz.
Cream of tartar	4 oz.
Clear sirup	60 lb.
Gelatine, 200 bloom	8 oz.
Water	1 lb. 8 oz.
Vanilla	3 oz.

Directions

Beat the egg whites, salt and cream of tartar to a wet peak. Cook the clear sirup to 230 deg. F. Add the hot sirup slowly to the beaten egg whites. Dissolve the gelatine in the hot water, add the vanilla, then add this mixture to the one previously prepared. Beat to a dry peak.

This can be used as an icing or as a stock or base to extend other icings.

Formula from William Gordon, Awrey Bakeries, through American Society of Bakery Engineers.

FORMULA NO. 469

Custard Icing Wartime Formula

Butter	20 lb.
Emulsifying shortening	20 lb.
Whole milk powder	12 lb.
4 X sugar	30 lb.
Clear sirup	15 lb.
Whole eggs	8 lb.
Vanilla	4 oz.
Boiled icing (Formula 468)	35 lb.

Directions

Cream the butter, shortening, milk powder, sugar and clear sirup together until light. Add the eggs slowly, then the flavoring. Finally add the boiled icing.

This icing can be varied by adding 1 lb. 12 oz. of crushed pineapple or chopped glace cherries.

Formula from William Gordon, Awrey Bakeries, through American Society of Bakery Engineers.

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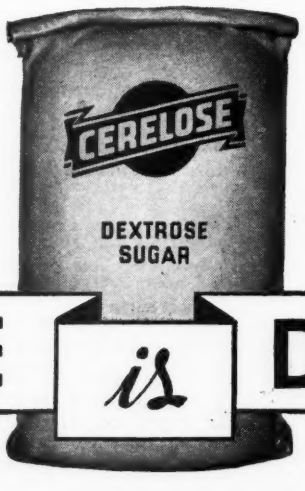

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